ms for Free Flight Model of Plane on Cover . . Page 17

MODEL AIRPLANE NEWS

AUGUST, 1947
TWENTY-FIVE CENTS

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H.P.: 1/6
Bore: 13/16
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MODEL AIRPLANE NEWS

JAY P. CLEVELAND
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AUGUST 1947 VOL. XXXVII No. 2

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WITH MULTI-JET BOMBERS and rocket powered research airplanes capturing the spotlight, AAF is not forgetting the unmatched utility of the lightplane in their future planning, as evidenced in the record of wartime performance of the *Grasshoppers*. The planes will be used by Army Ground Forces, following AAF procurement and acceptance. A competition was held recently at Fort Bragg, N.C., with 9 personal aircraft undergoing tests to meet minimum requirements. Sealed bids were submitted with Aeronca low at $1649 ea. for a two-place type and Bellanca low at $4650 ea. for four-place type. Although slightly outbid at $5695, Stinson may well receive an award because of the outstanding performance it displayed. The two-place models, of which 439 are to be ordered, are designated L-16A and the four-place models, of which 62 will be ordered, are designated L-17A. Both types will be stock commercial models which must meet standard CAA type test certification. Purpose of the order is to provide wide pilot training for AGF officers and enlisted men prior to delivery of special liaison planes designed for the purpose. The L-16's and 17's will also see rugged use at AGF posts around the country.

THE NAVY REVEALED that the Martin XP4M-1 contract calls for 4 experimental airplanes at $9,527,540 total cost. They are also interested in buying 8 additional planes at $1,750,000 each, but this latter option will depend on appropriation action.

A NEWCOMER TO THE aviation business, but a well known industrial firm for many years, is Frederic Flader Inc. They are now developing one of the most powerful gas turbine engines ever built and the most powerful aircraft installation yet projected. Another project is the design and production of a small expendable turbojet engine for target aircraft.

NORTH AMERICAN AVIATION finally decided definitely to abandon the *Navion* project, following a temporary halt reported last month. After producing 1110 of the trim four-place craft, NAA decision is based on the bleak outlook for continued high-level production which would be required in such a large firm. A total of 841 *Navions* have been delivered at the plant to make spare parts available for as long as they last and, in any event, for a minimum of two years; NAA assures owners of thorough attention for at least that period. NAA commitments on Army and Navy jet

(*Turn to page* 55)

The McDonnell *Banshee* is latest Navy jet job; this XF2D-1 is in 600 mph class and has climb of over 9000 feet per minute. Two Westinghouse axial flow 24" jets supply power

Said to be practically silent in operation, this modified L-5 has muffler, slow moving paddle blade prop and other noise reducing devices

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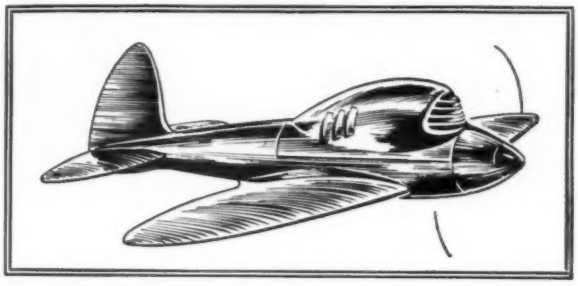

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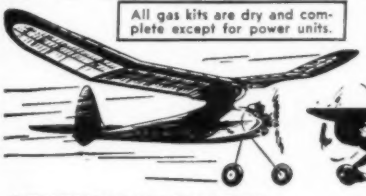

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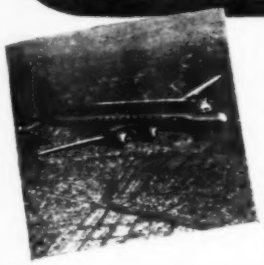

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This superior Timer weighs only ⅝ ounce. The unit has *silver* contact points. Needle adjusting valve equipped with lock nut holds setting. A vacuum operated timer releases near end of stroke to break contact. Spring lock release may be freed by flick of finger at instant of flight. *Price $1.85*

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Provides instantaneous polarized connection and disconnection of booster batteries. Designed to prevent short circuiting of booster batteries when not in use. Insulated heavy gauge wire resistant to gasoline and oil. Extra fuselage connectors available for modeler having a number of planes. *Price $1.25*

"Having so much trouble with 'war babies,' I decided to run the daylights out of every engine before we presented it for sale to our customers. Frankly, when I took the Arden .199 back in our test room, I was determined to either 'freeze' it or blow it to pieces.

We didn't even give the engine the courtesy of a break-in period, but immediately put the smallest prop available on it and let it run wide open for about 45 minutes. (Note: I was using a one quart fuel can for a gas tank.) The only reason I shut the engine off then, was because Mrs.— and the customers were complaining about the noise.

On checking the r.p.m. on a strobotac, I found we were getting a little over 13,000 r.p.m. I was so elated with this preliminary test, I decided to work on the right prop to get the utmost efficiency out of the engine. After a few trials and errors we found that a 7" diameter 8" pitch prop with a fairly wider than average blade gave use the greatest torque, thrust, and surprisingly, the greatest r.p.m.

We ran it for 32 minutes straight on this prop without a waver or faltering of power at 14,600 r.p.m. All tests were made with the standard jet, throttle arm, and engine inverted. To date we have actually logged 167 hours by the clock at top r.p.m. operation. Five of those hours were with a 4 oz. flywheel without a prop, running for not less than half hour periods, with engine tuned to a point where we thought it would disintegrate. Believe it or not, today the engine is in perfect condition."

(Source of unsolicited report given on request)

Ask your supply dealer or write for information

MICRO-BILT INCORPORATED

DANBURY, CONNECTICUT

Model Airplane NEWSLETTER

by AL LEWIS

PRAISE the Lord and pass the spool of rubber! The non-gas flyers are getting a break at last. Harvey S. Robbers of Oakland, Calif., announces the "Poor Man's Nationals" to be held out there at Livermore Airport on August 31 under the auspices of *Oakland Cloud Dusters Club*. Harvey says it's the Club's dream come true. A strictly rubber contest with the tops in prizes. Events will be for junior, senior and open flyers with Class C stick and fuselage rubber-powered models. In addition, a non-age event will be run for Wakefield models.

Another bit of recognition for rubber models! With plenty of play being given rubber events at the Nationals, and at the Plymouth International Meet in Detroit the week before the Nationals, rubber models may make a comeback after all.

The AMA is working on an internationally known concern to sponsor rubber powered model meets in a big way. If the deal goes through you'll see bigger and better prizes being offered for this type of craft than for engine events.

SPEAKING OF PRIZES brings us back to the subject of professionals (if any) vs. amateurs (if any). You may recall it was mentioned in several past columns. Some wanted professionals (those who work in the model industry) barred from meets; others wanted to see a professional class created. Out Brentwood, Mo., way, Don D. White takes a hot typewriter in hand and whips out the following retort:

"When I hear someone say 'professional' I want to start a first-class fight. Believe me, when a fellow starts trying to make a living at this racket almost all his modeling activities come to an abrupt end. Before my concern got going you could almost bet your life that a new ship would come out of my basement every two weeks. I was modeling almost entirely for pleasure with enough serious research sprinkled into it to make it interesting.

"I became interested in control line flying and found the field wide open and so enjoyed it a lot more because here I could get the pleasure and the research all in the same package. All of my time could be devoted to modeling—except when I was dragged bodily out of the basement by my wife. Almost without exception each ship was better than the last. In short, I was making almost constant progress. I was flying with reckless abandon, really enjoying every flight whether it ended successfully or in a crash. I didn't care if I lost a ship through recklessness because I could build another before the week was out. You see, I was trying every maneuver in the book because I wasn't afraid of the consequences.

"Then we started in business—and what a change! I haven't built a single ship (except a couple of magnesium prototypes) since July 1946. I have two ships and am so careful with them that I have hardly done a vertical without adding another grey hair or two. I attended almost every contest within easy driving distance of St. Louis, but didn't dare take a few days to go farther. Of all the meets I attended, I entered only four because my ships and motors were in such bad shape. The only reason I entered those was because of mishaps to other ships of my design and there was a possibility of our ships finishing "out of the money," or because we had an opportunity to sweep an entire event.

"I fly so carefully today that the fellows call me the 'old man.' In my spare time (hah, hah) I am in the basement figuring out new tools or methods, or on the road trying to locate materials. And then you have the nerve to mention the word 'pro-

(*Turn to page* 48)

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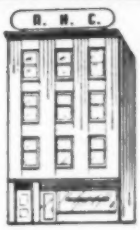

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(FREE: See Item 8 above)

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Bantam	(CL A)	18.50
Bullet	(CL B)	15.00
Ohlsson 19	(CL A)	14.50
Ohlsson 23	(CL B)	16.50
Cannon 300	(CL B)	18.75
DeLong 30	(CL B)	19.50
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Floatwind	(CL C)	24.75
Kon	(CL C)	32.50
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Hornet	(CL C)	35.00
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Hurleman	(CL C)	20.00
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Drone Diesel	(CL B)	21.50
Mite Diesel	(CL A)	18.95
McCoy 49	(CL B)	25.00
OK 60 Race	(CL C)	26.00
Forster 99		24.75

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(No Premiums)

Rogers Ram	(CL B)	9.95
G.H.Q.	(CL C)	15.00
New Thor	(CL B)	9.95*
New Thor Kit	(CL B)	6.95

*Includes coil and condenser

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Battery Box (all sizes)	$ .40
Megow Plastic (pan. or mod.)	.40
Aero Coil (Featherweight)	2.50
Aero Coil (Quality)	3.00
Smith Competitor Coil	1.95
Arden Coil	2.50
Winsten Coil	2.00
Wilco Coil	1.95
Regular Coil	1.50
Metal Condenser	.45
Paper Condenser	.20
Ignition Wire (6 feet)	.25
High Tension Lead Wire	.15
Spark Plugs (all sizes)	.50
Arden Booster Jack	1.25
Switch	.25
Alligator Clips	.10
Vitamite Wet Cell	2.35
Power-plus Flight Battery	2.75
Booster Battery	3.50
House Charger	4.45
Auto Charger	1.95
Arden Flight Timer	1.85
Austin Flight Timer	1.50
Comet Flight Timer	1.00
Hillcrest Flight Timer	1.25
Universal Needle Valve	.75
4-Way Plug Wrench	.15
Neoprene Tubing (per ft.)	.50
Spinit Starter	5.00
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Topping 10" Multi-pitch Prop	1.50
Topping 12" Multi-pitch Prop	1.75
Comet Props: 9", 10", 11" 12"	.35 .40
Hi-Pitch Props: 8", 9", 10", 45c; 11", 50c; 12", 13", 60c; 14", 65c.	
Snafu Plastic Prop 10" 12"	.75 .90
Topping 3 Blade Plastic Props	1.50
Sponge Rubber Wheels 2", 40c; 2 1/2", 50c; 3 1/2", 60c	
Traxler Balloon Wheels 2 1/2" 60c; 2 3/4" $1.00; 3" $1.25; 3 1/2" $1.50; 4 1/2" $1.75.	
Spray Gun 1.25 &	1.75
Modelers Plane	.75
Flywheels A or B, $1.00; C, $1.50	
Univ. Running Stand	1.25
Midget Screw Driver	.10
Hi-Tension End Clips, each	.05
Tip Jacks Set	.60
Jem Pump Can	.75
Plug Gauge Set	.15
Alum. Prop Spinners 5/8", 20c; 3/4", 30c; 7/8", 75c; 1 1/2", $1.00; 2", $1.25; 2 1/2", $1.50; 2 3/4", $1.75.	
Presto Disc Starter	.25
Bamboo paper—white, green, blue, each	.10
Wood Stripper	.25
Celluloid Sheet	.10
Austin Tank	.50
Froom Gas Tank	1.00
Winston Tank	.75

FREE FLIGHT PLANES

(FREE: See item 9 above)

For "A" & "B" Motors

Coronet 46"	$2.50
Buccaneer 48"	3.50
Buccaneer 36"	1.50
Bee 48"	1.95
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Pacer B 53"	3.95
Topper 41"	3.50
Roamer 45"	2.95
Zombie 44"	2.50
Rocketeer 40"	2.95
Playboy Jr. 55"	3.25
Buccaneer B Spl. 54"	3.95
Jiffy 36"	1.50
Stratos 42"	2.95
Amer. Ace 54"	3.95
Banshee 50" DeLuxe	6.95
Banshee Std. 50"	2.00
Wanderer 54"	3.50
Bay Ridge Mike 49"	2.00
Zipper 54"	5.95
Runt 44"	2.50
Air Feiler 44"	3.95
Zoomer 60"	6.95
Musketeer 54"	3.50
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Stanzel Intelcepter 51"	2.98
Skyrocket 36"	2.95
Ranger 48"	2.50
Comet Interceptor 42"	3.95
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Brigadier 38"	1.95
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Piper Cub Coupe 40"	1.95
Jersey Javelin 48"	3.95
Larkey 50"	3.50
Mercury Jr. 50"	3.95
Good News 50"	3.95
Powerhouse 56"	4.95
Strato Streak 40"	2.50
Spearhead Jr. 44"	1.95
Megow Piper Cub 53"	4.50
Ensign 50"	3.50
Ardent-Air 32"	2.00
Crusader 48"	7.50
Baby Quaker 35"	2.00
Humdinger 52"	3.95

For "C" Motors

Piper Super Cruiser 84"	$10.95
Pacer "C" 60"	4.95
Buccaneer Std. 68"	5.95
Buccaneer C. Spl. 72"	6.95
Super Buccaneer 90"	8.50
Mercury 72"	5.50
Playboy Sr. 70"	6.00
Stinson Reliant 78"	17.50
Musketeer Std. 72"	4.95
Cavalier 60"	5.95
Wag 60"	4.95
Vagabond 74"	5.50
Custom Cavalier 108"	15.00
Sailplane 78"	8.95
Spearhead Sr. 60"	3.95
Skybo 66"	6.95
Super Quaker 76"	7.00
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CONTROL-LINE PLANES

(FREE: See item 9 above)

Capitol Ercoupe 40" B-C	$ 7.50
Duraplane 26" B-C	12.50
Topping 21" B-C	10.00
Snafu Ercoupe 45" C	12.50
Fireball 36" B-C	10.00
Buzz 30" C	8.95
Perky 18" A	2.00
Streaminer 25" B	4.00
Aero Puppet 24" B-C	5.95
Controliners by Berkeley P47 41" C	5.95
P51 37" A-B	7.95
Bat 32" C	4.95
Bug 17" A	2.95
Tiger Shark 36" C	4.95
Strato-Cat 36" B-C	5.95
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Wood Control Reel 51/2" diam.	1.25
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U-Reely Deluxe Complete Control	7.50
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Snafu Accessory Kit	1.00
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O-Gee (Built-up Hull)	10.95
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3/16"	1.50
Single Struts 1 1/2"	.80
2"	1.00
Collars 1/8" or 3/16"	.25
Univ. Couplings 1/8" or 3/16"	1.25
Shafting 1/8", 1/8", 3/16", 1/4", 5/16", ft.	.25
Props: 2 Bladed: 2 1/2"	.50
3 1/2"	.60
3 Bladed: 3/4"	.45
1"	.45
1 1/4"	.50
1 1/2"	.80
2"	.80

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#44 Saw	1.25
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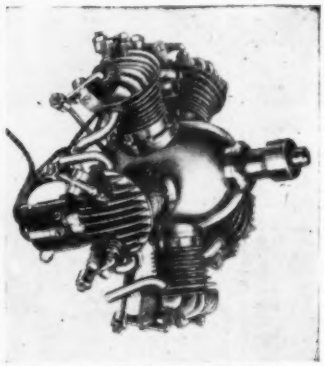

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Ohlsson 60	C	18.50
*Rocket	C	22.50
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*Rogers 29	B	15.75
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Vivell 49	C	20.00
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*Includes Coil and Condenser

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8, 9, 10 or 11 inch	50c
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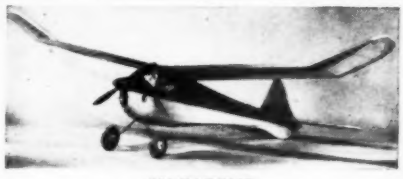

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American Ace, B	1.95	Pacer, C	4.95
Banshee, B	6.95	Playboy (Baby), A	1.00
Baby Quaker, A	3.00	Playboy Jr., B	3.25
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Musketeer Standard, C	4.95	Zipper, B&C	2.95

ACCESSORIES

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Aero Featherweight	2.50	Aero Tension Leads	.25	Control Braided, 105 ft.	2.25	C&R 2½ Cushion Wheels	1.00
Aero Quality Coil	3.00	Spark Plugs, any size	.50	Control Braided, 150 ft.	3.25	Topping Adj. Pitch Propl	1.75
Competitor Coil	1.95	Alligator Clips	.10	Ace Control Handle	.25	Nuts & Bolts	.10
Rogers Coil	1.75	Vitamite Wet Cell	2.35	Ace Swivel Handle	.35	Washers (Specify hole)	.05
Wilco Coil	1.95	Power Plus Super Flite	2.95	U Reely Control	7.50	Heavy Duty Neoprene, ft.	.25
Firecracker	2.75	Power Plus RC Special	5.50	Remoto Control	12.50	Transparent Gas Line, ft.	.15
OK Twin Coil	6.00	Austin Timer	1.50	Burgess Flight Battery	.55	Model Pins Package	.05
OK Twin Pack	3.00	Arden Timer	1.85	Burgess Flight Battery, Large	.85	Sandpaper	.05
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Metal Condensers	.35	Austin Needle Valve	.75	Burgess 4F2H Booster Battery	1.15	1 inch Batteries, med.	.10
Ignition Wire, 5 ft.	.15	Merco Needle Valve	.50	Snafu Props	.75	1¼ inch Batteries, standard	.10
		Control Wire, 105 ft.	.65	Snafu 90 Props	.90	Photoflash Penlites	.10

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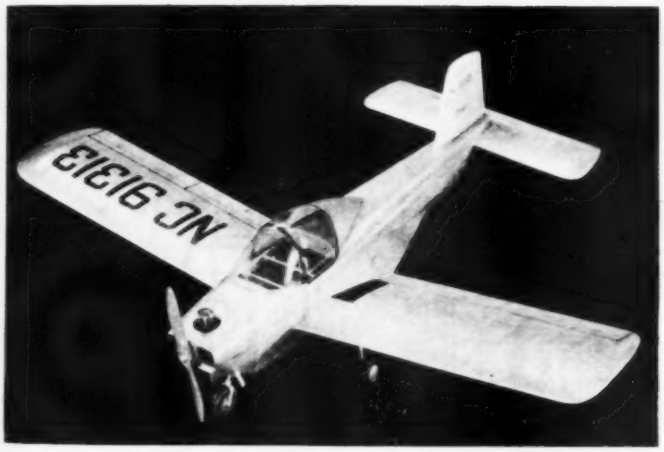
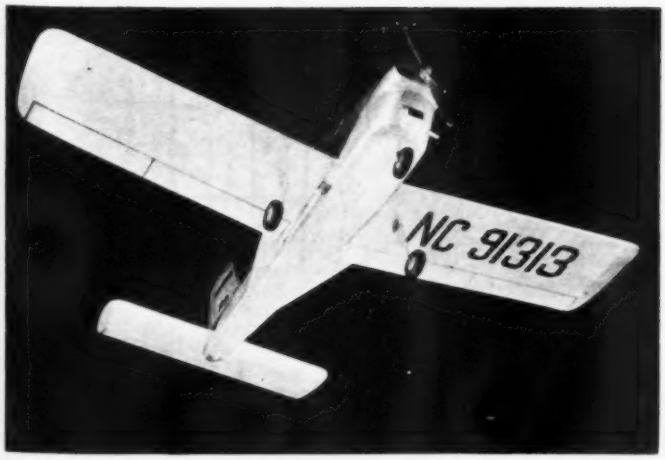
MODEL SKY SKOOTER

Skooter lends itself perfectly to model work—as a free flight plane it is ideal





by JAMES NOONAN

NEWEST of the sportplanes, the *Sky Skooter*, makes its debut. The squarish lines retain all the beauty and grace of other ships including extreme simplicity and great strength. These simple lines attract the eye of the model builder and this model will satisfy those who like a good looking scale model, powered by the new diesel motors.

To the author, gas engines are old fashioned. After obtaining the first *Dyno* diesel three years ago and experimenting with 35 different diesels since, gas engines somehow are no longer interesting. The *Mite* diesel was selected for this model because of its good performance and small size. The plans and photos show it mounted upright, but it is possible to mount it on its side, thereby completely cowling it in. Thanks to Wally Schroeder a *Mite* was received in time to be mounted and tested in this model.

In any event, learn to operate your diesel well before mounting it in a plane. An *Atom* (ours is converted to a diesel!) or similar size gas motor may be used in the model; place the ignition (ugh!) pack just over the wing in the center of the fuselage.

CONSTRUCTION—Scale the plans to full size. Using dividers, "blow up" everything to four times the size shown. The difficult parts have been drawn full size on page 19; all other lines on the ship are almost straight and parallel. Build fuselage sides of selected 1/8" sq. hard balsa or 3/16" sq. medium; join sides and attach bulkheads, stringers, tail block and 1/8" ribs to sides. Cut firewall (1/16" plywood) to fit; cover top of nose with 1/32" sheet. Carve rear of canopy from light balsa and hollow. Carve nose blocks to the outlines shown and hollow; fit to nose, attach motor bearers and front landing wheel strut; cement blocks to nose, cutting away balsa to allow fitting in motor.

Build wing next. Using metal template, cut ribs, slip on spars, carve tips and assemble. Fit wings in fuselage using strong gusset and ply reinforcement when joining wings inside fuselage. Bind and cement landing struts in place. Cover wings and fuselage with G.M. Silkspan, water spray all surfaces, and when dry, apply dope.

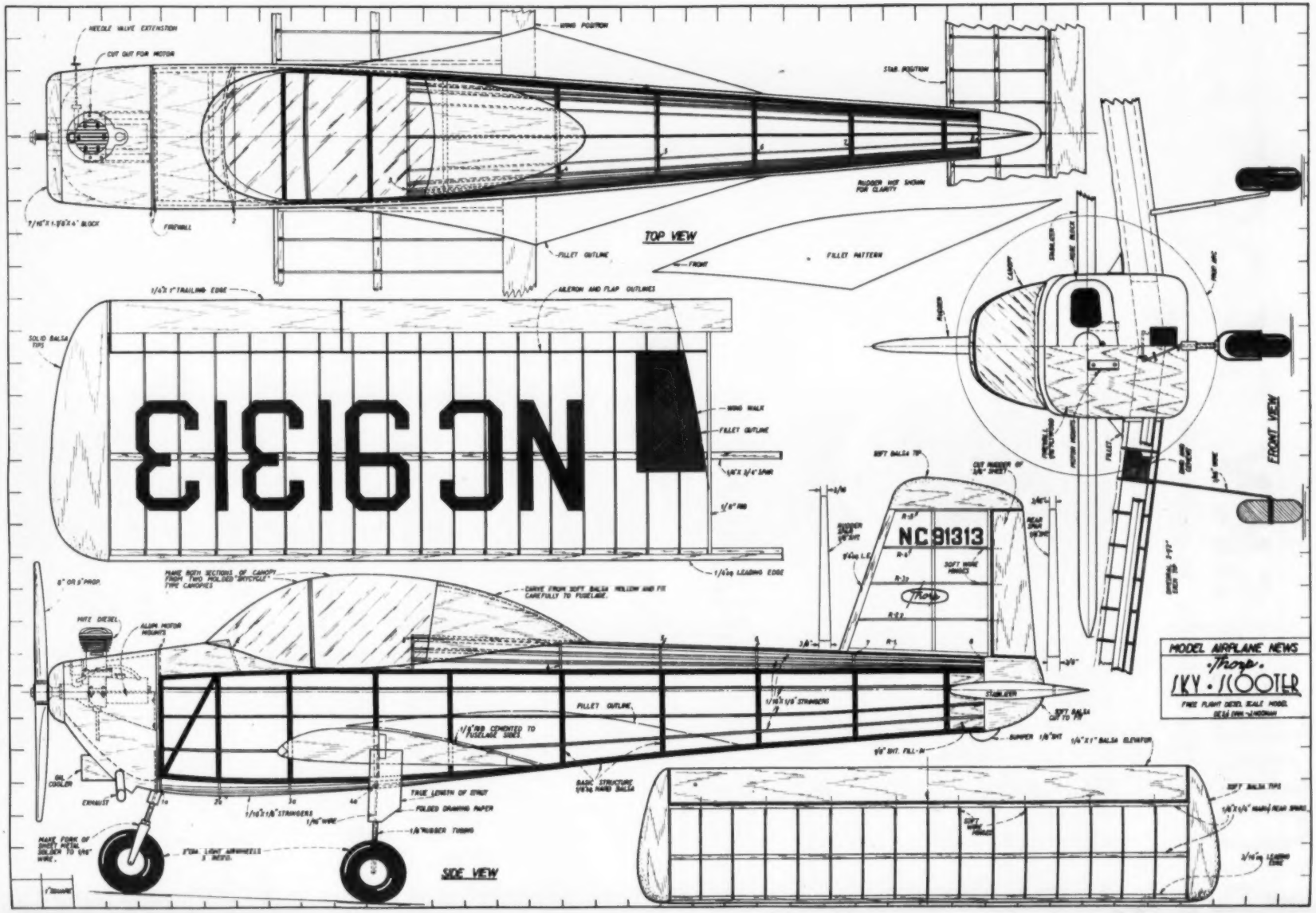
Two large *Skycycle* type molded canopies are juggled until the two panels of our model can be cut from them. Stick masking tape along the line of cut desired and make many cuts with razor blade until through. Do not use scissors. Attach canopy.

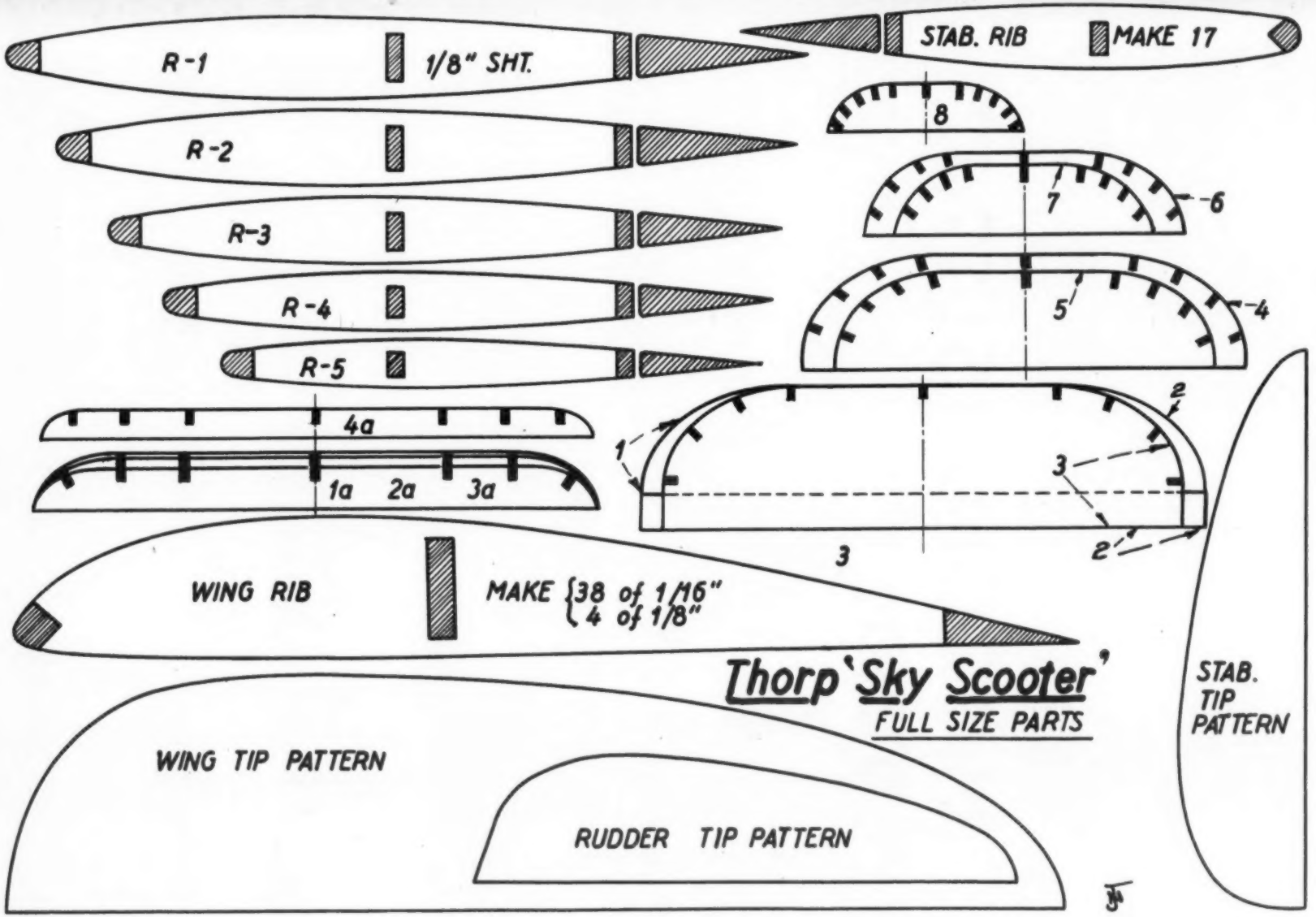
The tail surface drawings are self explanatory. Simply follow the plans carefully. Cement tail surfaces in place. Control surfaces should be stiff to move; their only function is to trim the ship for flight.

FINISHING—All paper surfaces should be given three or more coats of clear dope to fill up the pores in the Silkspan. Coat all bare wood surfaces with thin cement, rubbed in and sanded smooth. Go over the model, adding the fillet, strut fairings, etc. of stiff drawing paper or any other suitable material. Note fillet is not concave. Re-cement all joints such as landing gear, wing-fuselage junction, etc. Now give the model two or three thin coats of alum. dope to simulate the alum. covering of the original. When dry, add details in black, either with India ink or very thin black dope flowed on with a ruling pen.

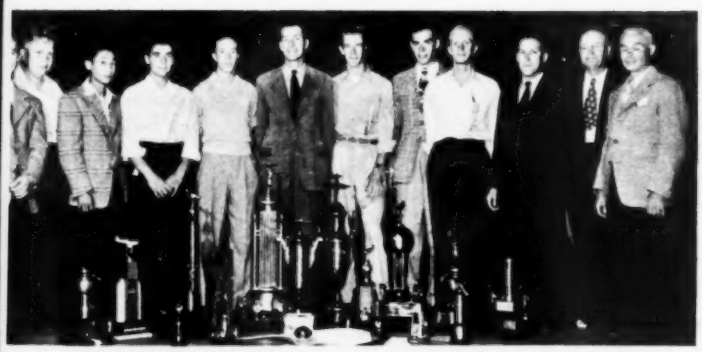
Mount your motor, attach prop, solder on landing wheels. Check the ship for balance by holding

(*Turn to page* 35)


NEEDLE VALVE EXTENSION
CUT OUT FOR MOTOR
WING POSITION
STAB POSITION
RUDDER NOT SHOWN FOR CLARITY
7/16" X 1-3/8" X 4" BLOCK
FIREWALL
TOP VIEW
FILLET OUTLINE
FRONT
FILLET PATTERN
1/4" X 1" TRAILING EDGE
AILERON AND FLAP OUTLINES
SOLID BALSA TIPS
NC 91313
WING WALK
FILLET OUTLINE
1/4" X 3/4" SPAR
1/8" RIB
1/4" X 1/2" LEADING EDGE
FRONT VIEW
CANOPY
SIDE BLOCK
PROP ARC
FILLET
6" OR 8" PROP.
MAKE BOTH SECTIONS OF CANOPY FROM TWO MOLDED "BICYCLE" TYPE CANOPIES
CARVE FROM SOFT BALSA HOLLOW AND FIT CAREFULLY TO FUSELAGE.
HITE DIESEL
ALLEN MOTOR MOUNTS
OIL COOLER
EXHAUST
1/16" X 1/8" STRINGERS
1/16" WIRE
1/8" RUBBER TUBING
MAKE FORK OF SHEET METAL SOLDER TO 1/16" WIRE.
3" DIA. LIGHT WHEELS 3 NEED.
1" SQUARE
SIDE VIEW
FILLET OUTLINE
1/16" X 1/8" STRINGERS
1/16" SQUARE CEMENTED TO FUSELAGE SIDES
BASIC STRUCTURE 1/16" HARD BALSA
TRUE LENGTH OF STRUT
FOLDED DRAWING PAPER
SOFT BALSA TIP
CUT MARKED OUT 3/8" SHEET
SOFT WIRE HINGES
STABILIZER
SOFT BALSA CUT TO FIT
BUMPER 1/8" DIA
1/4" X 1" BALSA ELEVATOR
SOFT BALSA TIPS
1/8" X 1/4" HARD BALSA
3/16" LEADING EDGE
MODEL AIRPLANE NEWS
Thorp
SKY-SCOOTER
FREE FLIGHT SCALE MODEL


R-1
1/8" SHT.
R-2
R-3
R-4
R-5
STAB. RIB
MAKE 17
8
7
6
5
4
4a
1a
2a
3a
1
2
3
3
2
WING RIB
MAKE {38 of 1/16"
4 of 1/8"
Thorp 'Sky Scooter'
FULL SIZE PARTS
STAB. TIP PATTERN
WING TIP PATTERN
RUDDER TIP PATTERN

NATIONALS! 1947



All these *Cleveland Balsa Butchers* won trophies, making them '46 Champion Club

Lights in this University of Minnesota Field House can be pulled up to roof

(Left) Paul J. Ring, Contest Director. (Right) Joe Rabinovitch of American Legion

by AL LEWIS

IN the 17th century Robert Cavalier de La Salle, a noted French explorer even then, thought of finding a Northwest passage to the East Indies. Taking his idea to the King of France he got the royal "okay," and bearing letters patent from King Louis XIV he sailed for the western hemisphere with a Franciscan friar, Father Louis Hennepin.

Father Hennepin accompanied the La Salle expedition which found its way westward through the Canadian wilderness to the Mississippi River. There he was captured by the Sioux Indians. While captive he discovered (in 1680) the falls which mark the head of navigation on the Mississippi—he named them St. Anthony Falls.

From St. Anthony on the east side of the river, grew Minneapolis on the west side. And now, 267 years later, Minneapolis is about to go down in the annals of model aviation as host to the 16th annual National Championship Model Airplane Contest.

Oh, brother, if the good Father were only alive to see what he started! Talk about shindigs—this one is expected to top 'em all.

Incidentally, before we leave the history class, you might be interested in knowing that the word Minneapolis comes from the Indian word "minne" meaning water and the Greek word "polis" meaning city. However, we understand open class contestants will still be able to quaff a tall cool glass of beer in an emergency (like after you forget to set the timer!).

This coming National meet, the 16th one recognized officially by the National Aeronautic Association and sanctioned by the contest board of the Academy of Model Aeronautics, will be held in Minneapolis and Monticello, Minnesota, on August 18, 19, 20, 21 and 22, under the sponsorship of the national American Legion and the 40 & 8 of Minnesota. The "40 & 8" club is Legion's Class AAAA organization—if we may draw a parallel between meet sanctions and Legion doings.

Competition will be open to all who can walk, run, ride, fly, crawl, bike, creep, swim, burrow, sail, drive, scoot, trot or hitchhike to the site. Originally, a series of state eliminations was planned to start this year, but time and sufficient manpower was lacking, so the '47 battle continues on as in the past—everybody welcome.

Outdoor model flying events will be held at a beautiful 364 acre airport in Monticello, 35 miles from Minneapolis. The location is said to be excellent, with terrain for miles around level and unobstructed by trees, wires or other flight hindrances. The Mississippi River is about half a mile south of the field but presents very little obstruction as the prevailing winds in August are south and southwest.

Indoor events will be run off in the University of Minnesota's field house, reported ideal for that purpose; it has a height of 112 ft., and length and width of 438 and 265 ft. respectively. Indoor modelers, after years of allegedly "ideal" indoor flying spots, will

(*Turn to page* 66)

·design forum·

by CHARLES H. GRANT

YOUNG designers find it a pleasing pastime to plan and lay out on paper their imaginary dream ships—it satisfies the creative instinct to a large extent. There comes a time in every designer's life, however, when he becomes fed up with pure theory and imagination, and he craves a practical demonstration of his creations.

In the past, Design Forum has discussed many ideas and theories which up to the present could only be demonstrated in the wind tunnel. Wind tunnel tests are the basis of nearly all development in full scale aviation and are the only way in which aerodynamic results can be demonstrated. However, such facilities are available only to a few topnotch engineers. The obscure experimenter must often resort to guesswork. A few master modelers have attempted, with some success, to study the reactions of models in free flight and thus determine the effect of their design characteristics. This method has been much like trying to pull oneself up by one's bootstraps—because in order to visualize its behavior a model must follow its flight pattern with complete stability, and usually complete stability cannot be obtained without careful study of many flights.

However, through many years of repeated crackups, trial and error, laws for basic stability have finally been established and the general behavior of a plane can be predetermined by applying the law of rotational stability developed by the writer and discussed in previous Design Forum articles. This is the theory of the direction and extent of roll about disturbing and recovery axes. By applying these stability laws to the design of your dream ships, it is possible to fly these planes as models and to discover the basic flight characteristics of the full scale airplane of this design.

Paul C. Korodi of Mansfield, Ohio, was extremely interested in what we have had to say about testing models in this manner and writes us that "it should be possible to make a model of an actual full scale aircraft which will behave similarly to the prototype as regards flight and ground characteristics." This is true except for one condition: there is no pilot to guide or control a free flight model; and if a free flight model of some actual full scale craft is constructed its flight will usually be quite critical and lacking in stability to some degree. This is due to the fact that in the design of most full scale aircraft, inherent stability is sacrificed for ease of control. In other words, the airplane is made less stable and more critical so that the pilot can handle it more readily.

The idea has prevailed that control cannot be obtained easily if great stability is present. This idea has definitely been proved incorrect by many experimenters. It is simply a case of *knowing how* to design a model possessing both these characteristics of stability and controllability. It may be accomplished by properly applying the laws of rotational stability along with modification of the tail surfaces and increase in dihedral. The rolling axis of any plane can be arranged to provide steadfast stability when control surfaces are neutral, yet cause instantaneous and intense reaction to only slight movement of the control surfaces.

However, as a rule, exact scale free flight models are comparatively unstable. In this respect they indicate accurately the critical characteristics of the full scale plane, and in order to make them stable enough to fly without a pilot certain modifications such as enlarging the tail surfaces, increasing the dihedral, etc., are usually necessary. This is required because a model in free flight must generate enough corrective moment when it deviates from normal flight to bring it back quickly to normal flight position.

Sufficient moment for stability in a model of a full scale aircraft can only be obtained by an increase in angle of the balancing surfaces such as stabilizer, fin and ailerons,

(*Turn to page* 43)

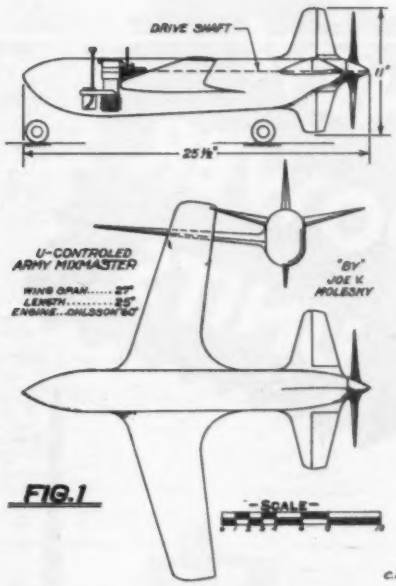


FIG. 1

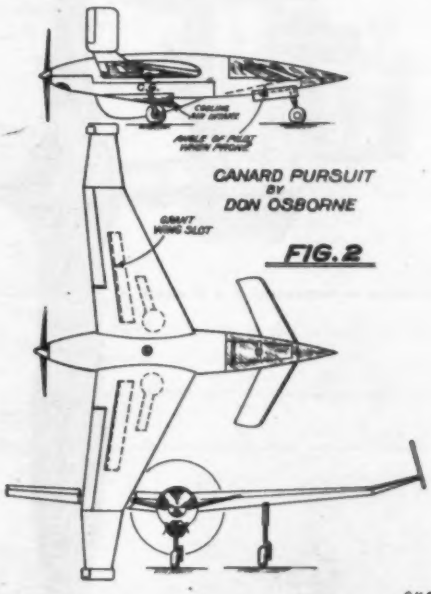


FIG. 2

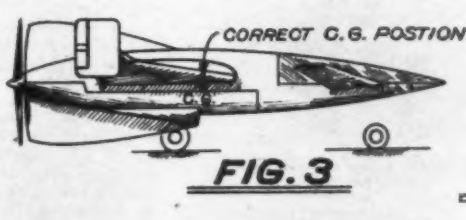


FIG. 3

NEW POWER UNITS

This *Edco* is the largest American diesel in production.

by EDWARD G. INGRAM

COMPARATIVELY recent developments in the field of model powerplants have been the introduction of jet engines and American built compression-ignition engines. Data on these engines, and also a hot coil ignition engine, a carbon dioxide engine, and additional spark-ignition engines, are presented in the accompanying tables.

Model compression-ignition engines, which are rather inaccurately termed "Diesels," have been considered to be in the development stage, but the manufacture of these engines on a quantity production basis is indicative of the advances made in this field of design. The outstanding advantage of the compression-ignition engine is, of course, the elimination of electrical equipment with its accompanying weight. For flight purposes the jet engine shares this advantage, and in addition possesses the characteristic of providing constant thrust with increased airplane speed. Electric ignition equipment is required to start the jet engine, however, and also a hand pump to initiate the flow of air through the mixing chamber.

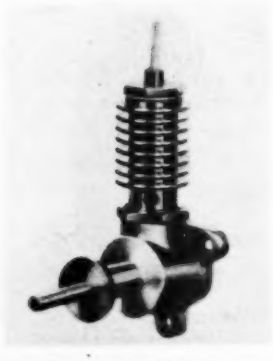
Compared with the spark-ignition engine, the compression-ignition tends to provide high torque at rather low engine speeds. Little or no reliable data is available on the maximum power output of compression-ignition engines, but indications are that the high speed spark-ignition engine still is well in the lead with regard to maximum power to bare engine weight, and this characteristic tends to make up for the additional weight imposed by electrical accessories. While compression-ignition engines require no electrical accessories, they are inherently heavier than the spark-ignition engine because parts must be made heavier to withstand the high compression and expansion pressures involved. It seems probable that there will continue to be a good market for both types.

Although compression-ignition engines have been in process of development in Europe for some time, jet engines appeared on the American market before American-built "Diesels." They operate on the pulse-jet principle.

Basic components of the *Minijet* engine are: a fuel nozzle, flutter valve, combustion chamber, and tail pipe. In operation, the forward movement of the unit causes air to be forced past the fuel nozzle where it is mixed with gasoline. The combustible mixture enters the combustion chamber through the flutter valve assembly where it is ignited by heat from the previous explosion. The force of the explosion closes the flutter valves. The burned and expanded gases exhaust out of the tail pipe, causing forward thrust and a drop in combustion chamber pressure which allows the flutter valves to reopen and admit a new charge. The process continues at an approximate rate of 230 times per second. The frequency of the explosions is determined by length and diameter of the tail pipe. The starting equipment includes two 2-1/2-volt dry cells, a Model T Ford coil, a sparkplug, and a tire pump.

The *Minijet* provides a static thrust of over 2 lbs., weighs approximately 16 oz., and has a length of 28-1/2". Its maximum diameter is 2". Aluminum alloy die castings are used for the venturi, carburetor, head, and shield. The nose fairing, blade keepers and body assembly nuts are made from brass, and the tail pipe from Inconel, a heat-resistant alloy composed of about 75% nickel, 13% chromium, 9% iron, and small amounts of manganese, silicon, copper and carbon. All other parts are made from stainless steel.

Hot coil ignition is featured in *H & H* motor



The *OK* CO_2 engine is shown herewith full size

TABLE 1. MODEL ENGINE CONSTRUCTION DATA

	Class	Displacement, Cu. In.	Cylinder	Cylinder Attachment to Crankcase	Cylinder Head	Cylinder Head Attachment to Cylinder	Crankcase	Piston	Connecting Rod	Crankpin Bearing	Wristpin Bearing	Crankshaft Bearing	Number of Cyl. Ports	Crankcase Admission Valve
SPARK-IGNITION ENGINES														
Everson 29	B	.290	Al. Alloy, 178-T Perm. Mold	Integral		Threaded	Al. Alloy, 178-T, Perm. Mold	Steel	Bronze	No Bushing	No Bushing	Bronze Bushing		Rotary, Shaft Type
Tom Thumb	C	.451	Steel	Threaded	Steel	Brazed	Die Cast	Steel, 2 Rings	Steel	Bronze Bushing	Cr. Moly	Bronze Bushing	3	
McCoy Red Head, Jr.	C	.491	Alum. Alloy, 195-T6, Meehanite Liner	Integral	Alum. Alloy, 195-T6	6 Screws	Alum. Alloy 195-T6	Alum. Alloy 142, 2 Rings	Alum. Alloy 24 S-T	No Bushing	No Bushing	Ball	2	Rotary, Disk Type
COMPRESSION IGNITION ENGINES														
Mite	A	.098	Steel	Screws		Screws		Steel Alloy, 4130	Steel Alloy, 4130		Ball and Socket	Bronze Bushing	2	Rotary, Shaft Type
C. I. E.	A	.147	Alum. Alloy, Meehanite Liner	4 Bolts	Steel, Cr. Moly		Alum. Alloy 356, Perm. Mold	Steel, Cr. Moly	Steel, Tubular	Tin Base	No Bushing, Bronze Pin	Oilite Bushing	4	
Drone Gold Crown	B	.296	Alum. Alloy, Sand Cast, Steel Liner	4 Screws	Alum. Alloy	4 Screws	Alum. Alloy, Sand Cast	Iron Alloy	Alum. Alloy	Bronze Bushing	No Bushing	Bronze Bushing	2	Rotary, Shaft Type
Edco Diesel	C	.450	Steel	4 Screws		4 Screws	Alum. Alloy, Die Cast	Steel, Hardened	Alum. Alloy, Forged	Bronze Bushing	No Bushing	Bronze Bushing	3	
HOT COIL IGNITION ENGINES														
H & H	C	.451	Iron, Cast	Threaded	Alum. Alloy	Screws	Alum. Alloy	Steel	Steel and Bronze			Bronze Bushing		

TABLE 2. MODEL ENGINE DIMENSIONS & PERFORMANCE DATA

	Class	Displacement Cu. In.	Bare Engine Weight, Ozs.	Weight per Cu. In. Disp., Lbs.	No. of Cylinders	Cylinder Bore and Stroke In.	Stroke-Bore Ratio (to 1)	Cylinder Compression Ratio (to 1)	Rated Horsepower	Revolutions per Minute at Rated Horsepower	Maximum Brake Horsepower	Revolutions per Minute at Max. Brake H.P.	Max. Brake H.P. per Cu. In. Disp.	Engine Weight per Brake H.P.	Recommended Propeller Dia., In.	Recommended Propeller Pitch, In.	Revolutions per Minute with Recommended Prop.	Type of Mount
SPARK-IGNITION ENGINES																		
Everson 29	B	.290	7.75	1.76	1	.687 x .781	1.14	8.00	1/6	8,000					11	8	7,500	Beam
Tom Thumb	C	.451	7.25	1.00	1	.875 x .750	.86	6.00	.44	10,000					11	6	10,000	Beam
McCoy Red Head, Jr.	C	.491	10.00	1.27	1	.890 x .790	.89	7.50	.80+	14,000	.93	14,400	1.935	.628	9	10	13,900	Beam
COMPRESSION-IGNITION ENGINES																		
Mite	A	.098	2.75	1.75	1	.500 x .500	1.00	13.50							8	8	9,000	Beam
C. I. E.	A	.147	5.50	2.34	1	.500 x .750	1.50								9	6	6,000	Log & Radial
Drone Gold Crown	B	.296	10.00	2.11	1	.656 x .875	1.33	18.00	1/5	6,100					9 to 14	4 8	5,400 4,400	
Edco Diesel	C	.450	14.50	1.39	1	.840 x .812	.97	19.00	1/6	7,500					12	8	7,500	Beam
HOT COIL IGNITION ENGINES																		
H & H	C	.451	8.00	1.11	1	.875 x .750	.86								10-12	8		Beam
CARBON DIOXIDE ENGINES																		
O. K. CO_2		.0178	.75	2.63	1	.275 x .300	1.09			7,000					8	3		Radial

TABLE 3. PULSE-JET ENGINE DATA

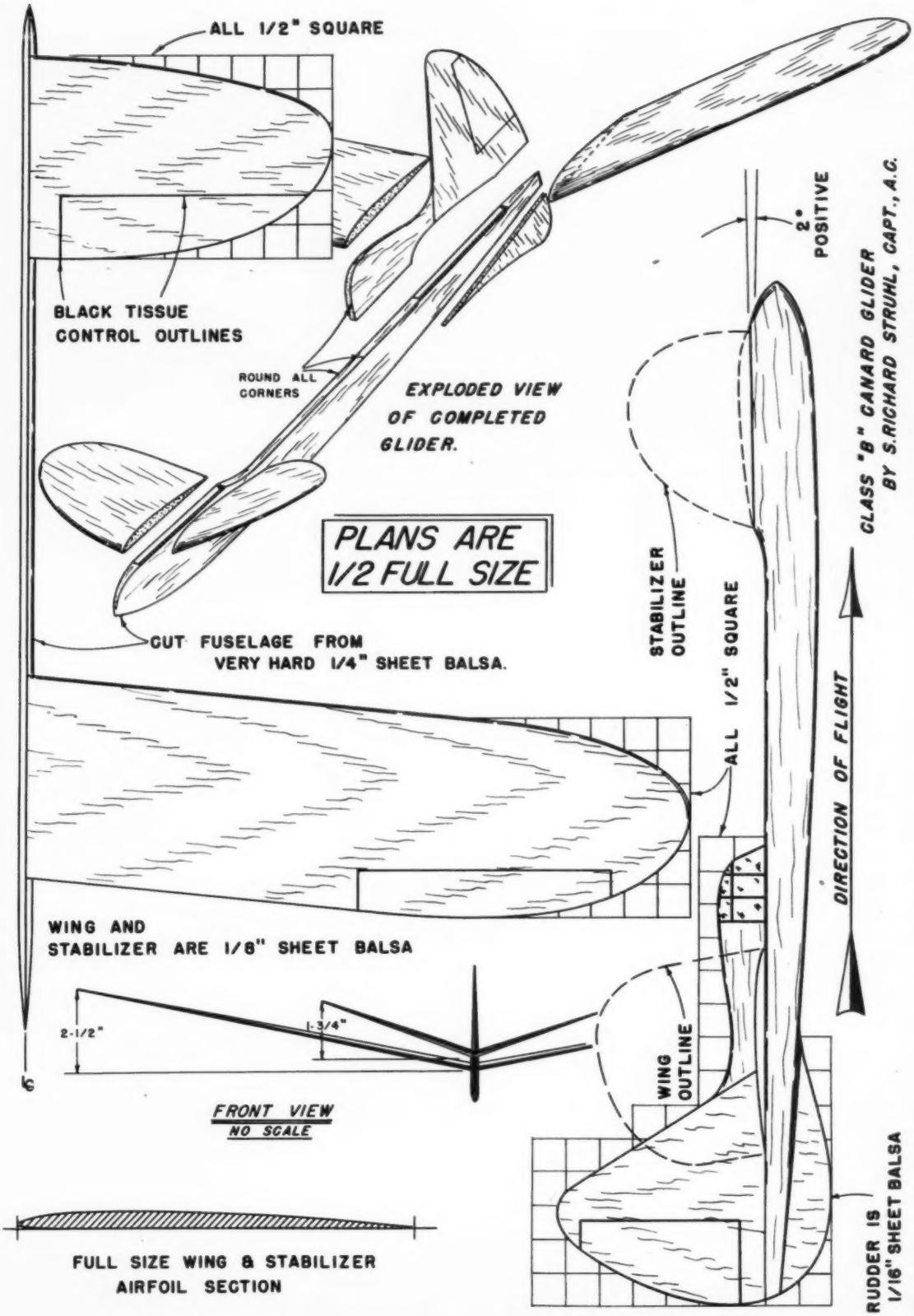
	Thrust, Lbs.	Cycles per Sec	Overall Length, In.	Maximum Diameter, In.	Weight, Oz.	Fuel	Materials
Minijet	2+	210-230	28½	3	16	Gasoline	Venturi, Carburetor, Head and Shield, Die Cast Alum. Alloy; Nose Fairing, Blade Keeper, and Body Assembly Nuts, Brass; Tail Pipe, Inconel.
Dyna-Jet	3½	280-300	21¼	2½	16	Gasoline	Combustion Tube, Stainless Steel; Valve Head and Retainer, Alum. Alloy; Metering Jet, Brass; Flow-jector, Steel, Heat Treated

Another jet powerplant is the *Dyna-Jet*, which is stated to develop a thrust of 3-1/2 lbs. when operating at 280 to 300 cycles per second. Maximum diameter of this unit is 2-1/2", length 21-1/4", and weight 16 oz. The combustion tube is made from a special grade of stainless steel. Heat treated aluminum alloy is employed for the valve head and valve retainer. The metering pin is made from brass, flow-ejector from steel, and the valve from a special grade of high carbon steel, heat treated.

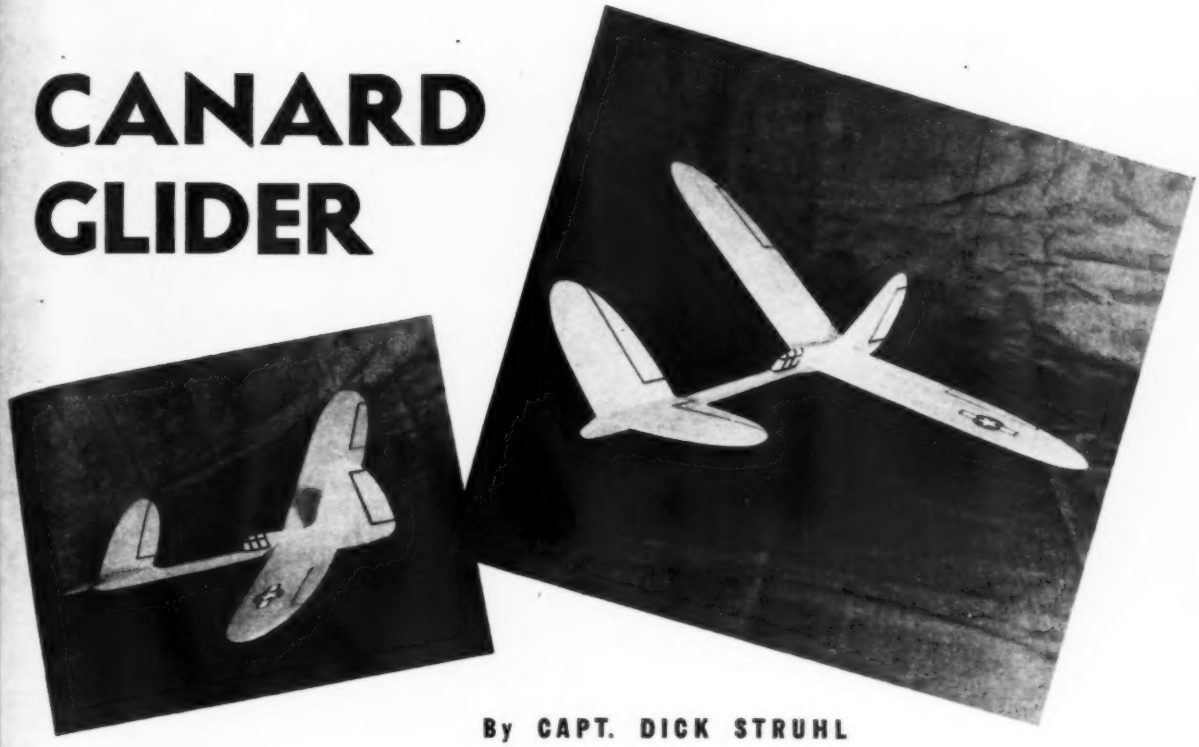
It is reported that in a recent test a *Dyna-Jet* was run continuously for two hours without failure or harmful effects, and that one was started without difficulty at a temperature of 65° below zero in the AAF Frigidtorium at Wright Field. One advantage of the pulse-jet engine is its simplicity. For example, the *Dyna-Jet* engine has only seven parts, and only one is a moving part. Temperature and velocities of the gases in jet engines are high, however, and this necessitates use of durable, heat-resisting materials for satisfactory operation.

A characteristic of the *Drone Gold Crown* compression-ignition engine, designed by Leon Shulman, is the high torque developed. It is stated tests show the engine will turn a 12" diameter, 6" pitch propeller at 6100 rpm without use of a flywheel. Speeds ranging from 4400 rpm with a 14" diameter 8" pitch propeller, to

(*Turn to page* 63)


ALL 1/2" SQUARE
BLACK TISSUE
CONTROL OUTLINES
ROUND ALL
CORNERS
EXPLODED VIEW
OF COMPLETED
GLIDER.
PLANS ARE
1/2 FULL SIZE
CUT FUSELAGE FROM
VERY HARD 1/4" SHEET BALSA.
WING AND
STABILIZER ARE 1/8" SHEET BALSA
2-1/2"
1-3/4"
FRONT VIEW
NO SCALE
FULL SIZE WING & STABILIZER
AIRFOIL SECTION
2° POSITIVE
STABILIZER
OUTLINE
ALL 1/2" SQUARE
DIRECTION OF FLIGHT
WING
OUTLINE
RUDDER IS
1/16" SHEET BALSA
CLASS "B" CANARD GLIDER
BY S.RICHARD STRUHL, CAPT., A.C.

CANARD GLIDER



By CAPT. DICK STRUHL

THIS month we present a most unusual Class B handlaunch glider. The model is unique in several respects: the canard design which has been used before never attained great popularity due to sensitivity of adjustments. That bugaboo is eliminated by merely employing a large angular difference between the wing and stabilizer.

Most conventional gliders are designed with zero degrees difference between wing and stabilizer to obtain maximum speed and consequent maximum lift. With a zero degree setup in the canard design, whether glider or powered model, recovery distance is lengthened to dimensions which are often disastrous. You are more than compensated when employing a canard design by the fact that you gain an extra wing. The extra wing is in the shape of the stabilizer which can employ a true lifting airfoil and also an increase in size over the conventional tractor stabilizer. Thus, instead of loosing lift we gain an appreciable amount.

Spiral stability is ideally obtained through use of a large rudder and a large degree of dihedral in the stabilizer—or if you prefer, the front wing. Circles of 25 feet are possible, and as you know, small circle adjustments are needed to stay in those thermals.

Note that a cabin has been added to the fuselage for a touch of realism. This should particularly appeal to the beginners who want their models to maintain some of the appearance of the "big ones." We have also added fake control surfaces for this purpose. These details can all be seen in the photographs, and this little touch of realism does not detract from flying performance.

The model is designed basically as an outdoor handlaunch type but may be catapult-launched, and may be used indoors if lighter material is used in the construction.

CONSTRUCTION—The plans are drawn to the convenient scale of 1/2" to 1", so all you need do to obtain final dimensions is double the magazine size. The wing and stabilizer crossection is shown full size. All curved outlines are obtained by drawing the graphs as shown.

If you are as lazy as the author, you can use *Jasco* glider wing sections to make the wing and stabilizer; otherwise they must be cut to shape from sheet balsa. Trace the wing design on a piece 1/8" by 3" by 20-1/2". Note that a wedge is cut in the center to give the necessary sweepback. Now using a plane or rough sandpaper and razor blades, shape the wing to the required crossection. This is shown full size in the drawings. Finish with progressively finer sandpaper to 10/naught. Block the wingtips up to 2-1/2"; then trim the dihedral joint to a flush fit. Cement the two wing halves together. After the cement has set, apply at least four coats of cement around this joint to form a cement skin for maximum strength.

The front wing, or stabilizer, is built in the same manner as the wing. Be sure the trailing edges of the stabilizer are sanded thin enough to be flexible. This is necessary for making fine flight adjustments. Dihedral of 1-3/4" is installed under each stabilizer tip. Form a cement skin at the dihedral joint same as on the wing.

The rudder is very simple. Merely make the drawing on a graph as shown and cut the rudder from 1/16" sheet balsa. Note that the rudder is in two sections: the rudder proper and the underslung portion.

The fuselage is cut from rock hard sheet balsa 1/4" by 1" by 15-1/4". Be sure the stabilizer platform has from 2 to 4 degrees positive incidence in relation to the wing angle. *This is most important!* If you are a beginner we advise a full 4 degrees; and less for the expert.

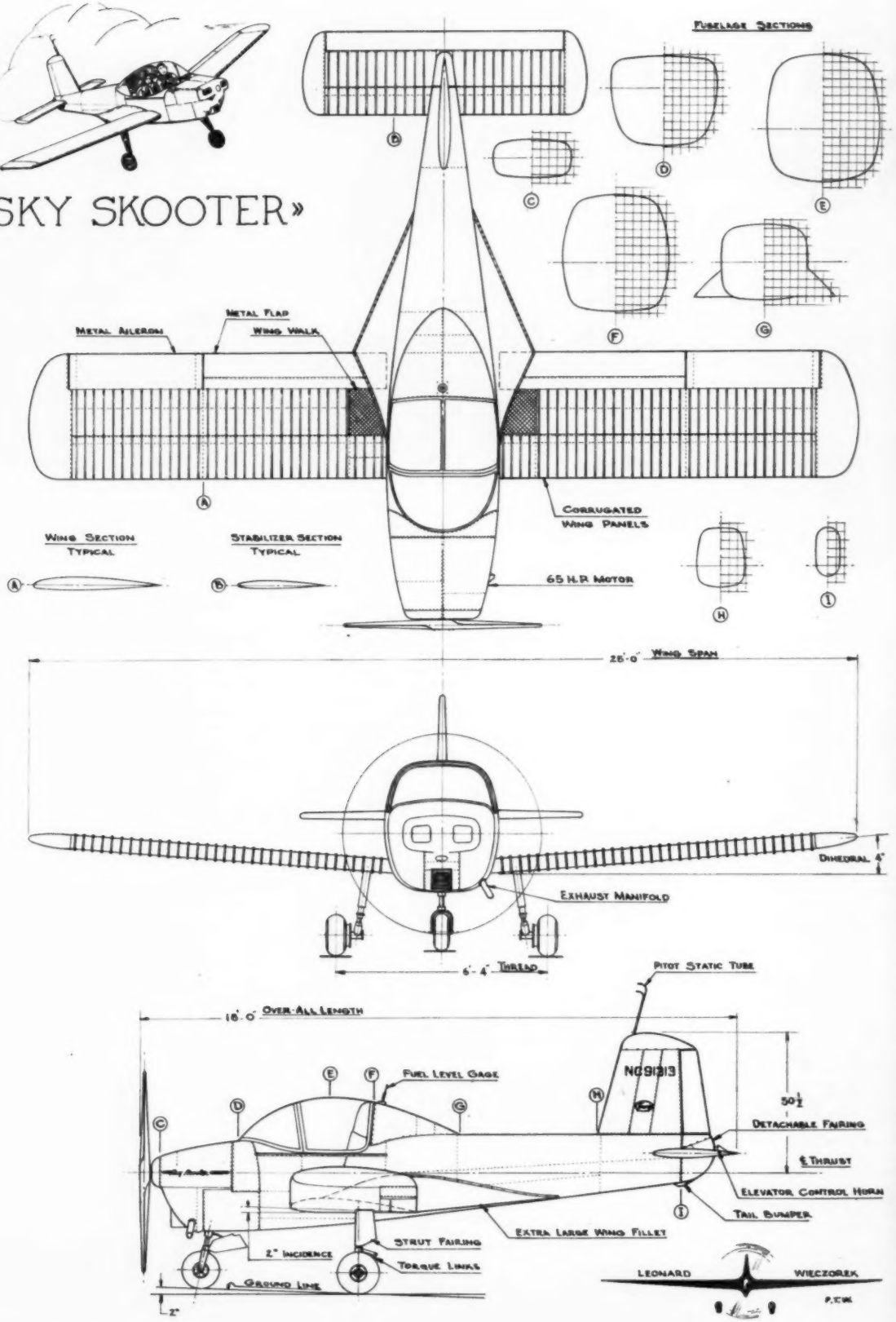
Cut grooves in the fuselage for wing and stabilizer and cement in place. Proper locations are obtained from the side view drawing. The proper assembly may be seen in the exploded view on the plans. Now add the rudder. The cabin section is cut from 1/8" sheet. Do not cut window spaces in the canopy but leave it solid and dope strips of black tissue to it to form the "green house."

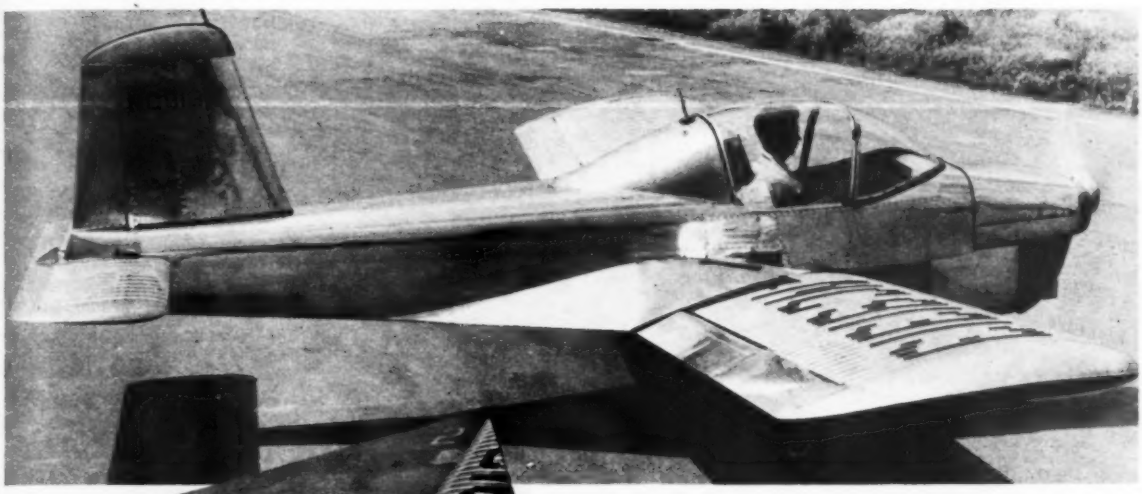
Go over the entire model now with sandpaper and round off all corners. Go over all joints and make sure there is plenty of cement on them. The model is now given two coats of wood filler with 10/naught sandpapering between coats. An excellent wood filler can be made by mixing talcum powder with clear dope and a drop of castor oil. The oil acts as a plasticizer. Dope strips of black tissue in place to outline the control surfaces.

FLYING—Grasp the model between thumb and index finger at the fuselage-cabin section and gently launch into the wind. The flight path desired is a rather tight left circle and a very flat glide with no stalls or "mush." Circle is adjusted by bending the rudder slightly. Breathing on the wood when you twist it aids its permanence. If the model stalls excessively, add a little modeling clay to the nose. Otherwise bend the trailing edge of the stabilizer up. If the model dives, bend the trailing edge down.

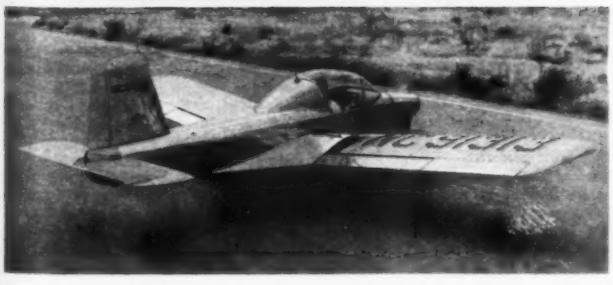
After the model is properly adjusted, try for duration flights. The model is thrown with an overhand baseball swing and in a slight *right* bank. Put all you have into that throw. The model should rise in a slight right turn; then at the top of the throw snap over to the left circles. In other words, the model is launched in a bank opposite to its natural flight path. This will give you maximum altitude for long cross-country flights. Here's to your foot-power!

SKY SKOOTER»


FUSELAGE SECTIONS
METAL AILERON
METAL FLAP
WING WALK
CORRUGATED WING PANELS
WING SECTION TYPICAL
STABILIZER SECTION TYPICAL
65 H.P. MOTOR
26'-0" WING SPAN
DIHEDRAL 4°
EXHAUST MANIFOLD
6'-4" TREAD
PITOT STATIC TUBE
16'-0" OVER-ALL LENGTH
FUEL LEVEL GAGE
NC9313
50½
DETACHABLE FAIRING
ELEVATOR CONTROL HORN
TAIL BUMPER
EXTRA LARGE WING FILLET
STRUT FAIRING
TORQUE LINKS
2° INCIDENCE
GROUND LINE
LEONARD WIECZOREK



THORP SKY SKOOTER



PLANE ON THE COVER

THE personal aircraft manufacturing industry offers a seemingly endless number of approaches to the problem of offering Mr. and Mrs. John Q. Public economical aerial transportation. It's not even necessary to delve into history, where the strangest of all aviation stories are to be found—still undiscovered. The current list of almost one hundred different lightplane enterprises offers the complete range of approaches to the problem.

All of these varied methods fall into one of two categories: (1) Build a low priced airplane and the public will buy it in volume; or (2) Build a high priced airplane with mass appeal and public volume buying will lower its cost. Piper is the world's outstanding exponent of (1), and the ubiquitous *Cub* has become the synonym for lightplanes of all sizes, shapes and forms. Republic has taken the approach of (2) and met with considerable success. Between these two extremes lie all of the 98 other "manufacturers" with their approaches varying from one extreme to the other.

The ideal approach of course is a combination of the two, and that is the method employed by John W. Thorp, designer of the *Sky Skooter*, our Plane on the Cover this month. Thorp, however, happens to be one of the best qualified engineers ever to strike out "on his own" in this old but still enticing business. The list of individuals who have thrown over the traces and built an original design in their backyard contains literally thousands of names. The list of volume sales personal aircraft manufacturers is less than 20. John Thorp hopes to join the latter list. He banks on the appeal of outstanding and original engineering features *plus* low purchase price to parlay his ideas into a successful manufacturing enterprise.

Thorp came up the hard but conventional way in the aeronautical engineering game. He worked up through the Lockheed Engineering Department in its Vega wartime subsidiary to the Preliminary Design group, where all the fun and most of the headaches of aircraft engineering abound. This is the idea room where you design what you want first and then figure out if it's practical afterward, rather than the reverse out in the Engineering Department's drafting groups. Thorp's clearheaded engineering ability and originality brought him to the post of Assistant Chief of Preliminary Design at Lockheed's Factory "A", where heated but progressive debates over the entry of Lockheed into the personal aircraft field were long and arduous. The result was a "Go ahead!" to John Thorp, and his talented pencil went to work on one of the most fabulous airplanes ever built. With one eye on its military application (we were deeply involved in another unpleasantness in Europe at the time), Thorp set out to design a device that would take a man from the ground, fly him through the air

(*Turn to page* 52)

by James R. Custin

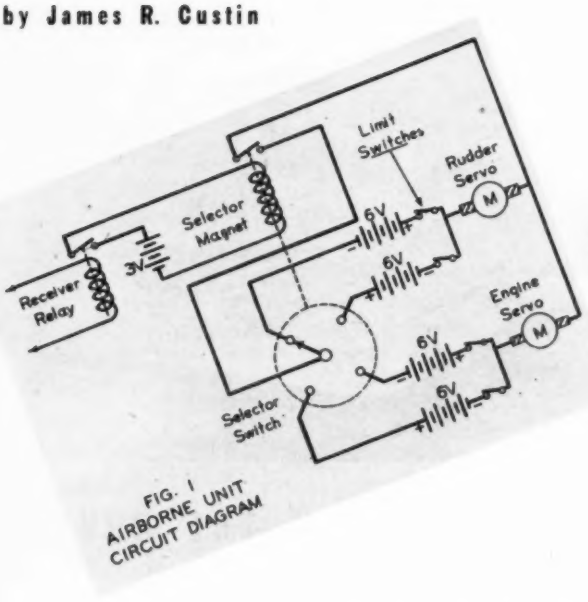


FIG. 1
AIRBORNE UNIT
CIRCUIT DIAGRAM

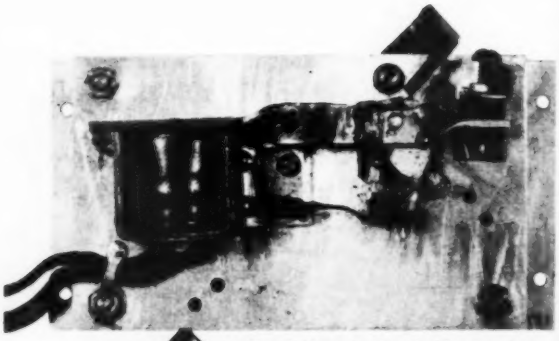


Fig. 3 Magnet side of airborne selector

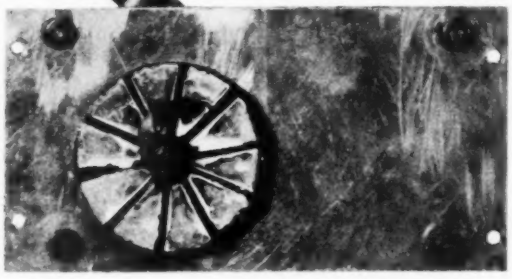


Fig 2 Top of airborne selector unit

COCKPIT RADIO CONTROL

PART I

WHEN my brother Tom and I began working on the development of a model airplane radio control system we set out to achieve the ultimate in realistic control operation—a system in which the ground control station would be in every essential respect a reproduction of the cockpit of a man-carrying ship, so that the operator could control the flight of the model with the same type of controls used on a big airplane, moved in exactly the same way.

Thus the ground "cockpit" of our control unit would be equipped with the usual joystick and throttle levers, and each control on the model would be made to follow accurately the movements of the appropriate lever of the ground control station, always taking a position corresponding exactly to that in which the lever at the "cockpit" was placed.

It is obvious that only a rather intricate mechanism will fulfill these requirements; but the problem is further complicated by stringent weight limitations. AMA rules permit a 15 lb. maximum gross weight for a radio controlled model, but 10 lbs. is the practical maximum for a model powered by any of the more popular engines now on the market.

We estimated that our airborne control unit would have to weigh less than 4 lbs. if it was to be carried by a ship built to this limitation; and 3 lbs. seemed a much more desirable figure. This would include the necessary batteries, as well as the receiver or receivers, selector, and control activator units.

Eventually we succeeded in building a fairly successful model in which the airborne control unit weighed 3-1/2 lbs., including an 8-1/2 oz. "B" battery—a compromise between what we wanted and what we could have. Although we were never completely satisfied with the system we developed, we did make a few successful flights with it. Unfortunately our "team" was separated by a matter of a thousand-odd miles before we could achieve all the refinements in the system that would bring it to a state of perfection; but we convinced ourselves that we were on the right track and that we had a cockpit type control system that really worked.

This article, therefore, is not a set of instructions that will enable the model builder to assemble a proven cockpit radio control system in a few evenings at home. Rather, it is a discussion of the systems and equipment with which we experimented, intended to point out some lines of approach and the possibilities that they present for those who are willing to do the necessary engineering to bring the radio control system de luxe to its full state of development.

As we began our preliminary design work, we decided to limit ourselves at first to a two control system, providing means for controlling only engine speed and rudder position. We reasoned that directional control of the model is obviously necessary; and since a model having a high degree of inherent stability will respond satisfactorily to displacement of the rudder alone, the additional complications entailed by aileron controls or linkages are unnecessary. It is also desirable to provide some means for controlling the ship's altitude. This may be achieved by an elevator control, but there is always the uncomfortable possibility that the control mechanism may stick when the elevators are down. On the other hand, a well designed gas model will climb under full engine power, fly level at some cruising rpm, and descend when the engine is idled or cut. We therefore decided to concentrate for the time being on precise control of engine rpm as our means for controlling altitude, adding an elevator control after we had perfected the system.

Engine speed regulation may be accomplished either by controlling the position of the spark timer lever or by means of a controllable butterfly valve on the carburetor venturi; but best results are obtained from a combination of the two. Thus the ideal two cycle engine for a radio controlled model would have a linkage connecting the timer arm with a butterfly valve on the carburetor, so that closure of the butterfly valve would be proportionate to retardation of the spark, thus simultaneously enriching the mixture and reducing the fuel charge to the cylinder as the spark is retarded. We did not do any experimental work on this feature but took the course of least resistance by providing only a control for the timer arm.

The mechanical design of the radio control system presented some additional considerations to which we gave much thought. Our first problem was to select the type of servo unit or control activator that would best suit our needs. It was obvious that the popular and practical rubberband escapement activator would not be satisfactory since it provided only a limited number of control positions.

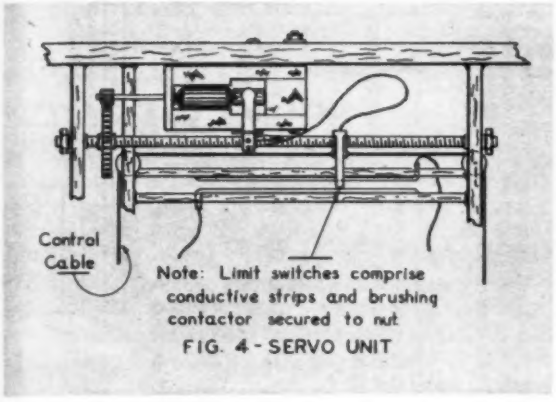


FIG. 4 - SERVO UNIT

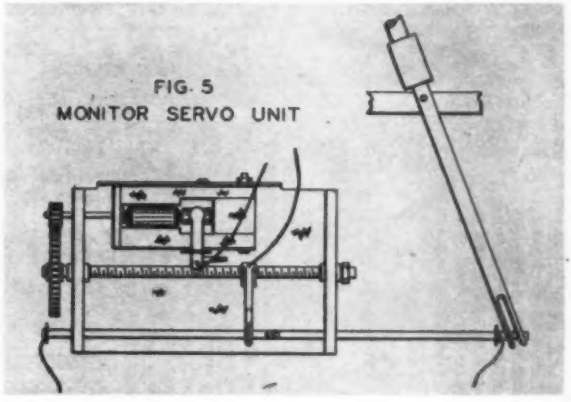


FIG. 5
MONITOR SERVO UNIT

Solenoid operated activators were also out of the question, for the same reason. We therefore concluded that the simplest device for providing the type of control activation we desired would be an electric motor driven servo unit.

Our next problem was to decide on the type of selection we wished to employ. A radio control system of any complexity requires a selector to route signals from the receiver to the activators so that the proper control will be moved in the desired direction. Although there are several devices whereby selection may be effected, all selection systems fall into either of two general types: multi-channel selection or sequence selection.

The most obvious multi-channel system involves use of several carrier frequencies, one for each control—or rather one for each direction in which each control is to be moved. A separate receiver is tuned to each carrier frequency, so that a model having only engine and rudder control would have to carry four receivers, each tuned to a different carrier—rather a large order. Moreover, multiple carrier selection requires use of as many transmitters on the ground as there are receivers in the plane; or at least some device for rapidly and automatically changing the frequency of a single transmitter to tune it to the receiver corresponding to the control motion selected. As far as we were concerned, multiple carrier selection was out of the question.

We also gave some thought to the use of a single carrier modulated with a number of audio frequencies. Control selection would be effected by feeding the audio output of the receiver to a number of magnetic reeds tuned to vibrate selectively to the transmitted audio frequencies, or to a number of highly peaked audio amplifiers. We decided against the use of tuned reeds because we felt they would be too sensitive to temperature changes and engine vibration; and we rejected peaked audio because the necessary chokes or transformers would have been excessively heavy. But recent developments in ultra-high frequency equipment point to the possibility that some form of peaked audio selection may soon be practical even for small radio controlled models.

Having decided against multi-channel selection, we turned our attention to the development of a sequence selector which would meet our requirements.

The well known rubberband escapement is really the simplest form of sequence selector, combining the functions of selection and activation in one simple unit. It serves to exemplify the one defect of any sequence selection system —there is a variable time delay involved in almost every control operation, since the escapement must frequently pass through several undesired positions before it is brought to the position selected. At first we were somewhat concerned about this time lag element, especially since the operator is unable to anticipate the exact length of the delay in any particular instance. In practice, however, we found that even a relatively crude selector will respond accurately to ten selection steps per second. One experimental escapement type selector switch, developed by Robert G. Stoneman, gave accurate selection responses at rates as high as 196 selection steps per second.

We concluded, therefore, that the advantages of sequence selection outweighed its theoretical disadvantages, and we turned our attention to the development of a selector that would be completely automatic in its operation.

The system that we designed around this device is best explained by starting with the airborne unit. (See Fig. 1.)

(*Turn to page 67*)

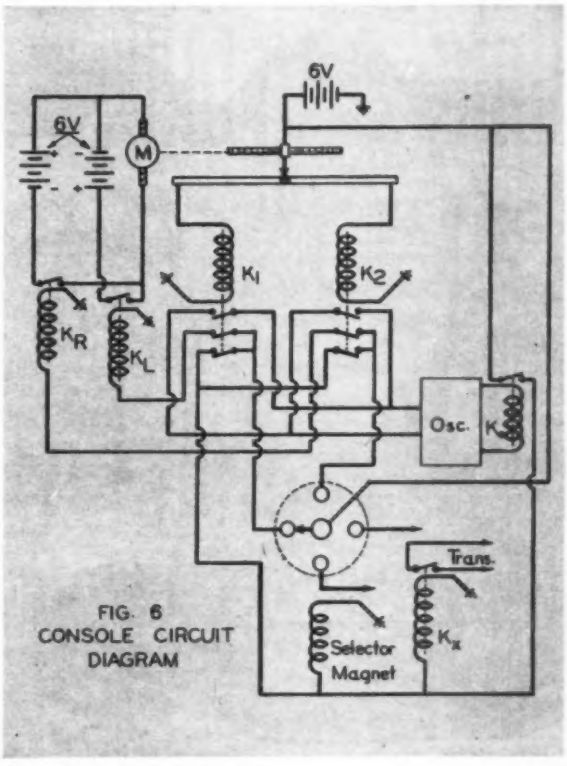


FIG. 6
CONSOLE CIRCUIT
DIAGRAM

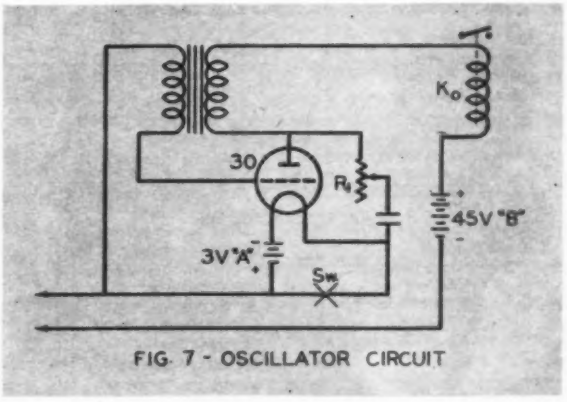


FIG. 7 - OSCILLATOR CIRCUIT

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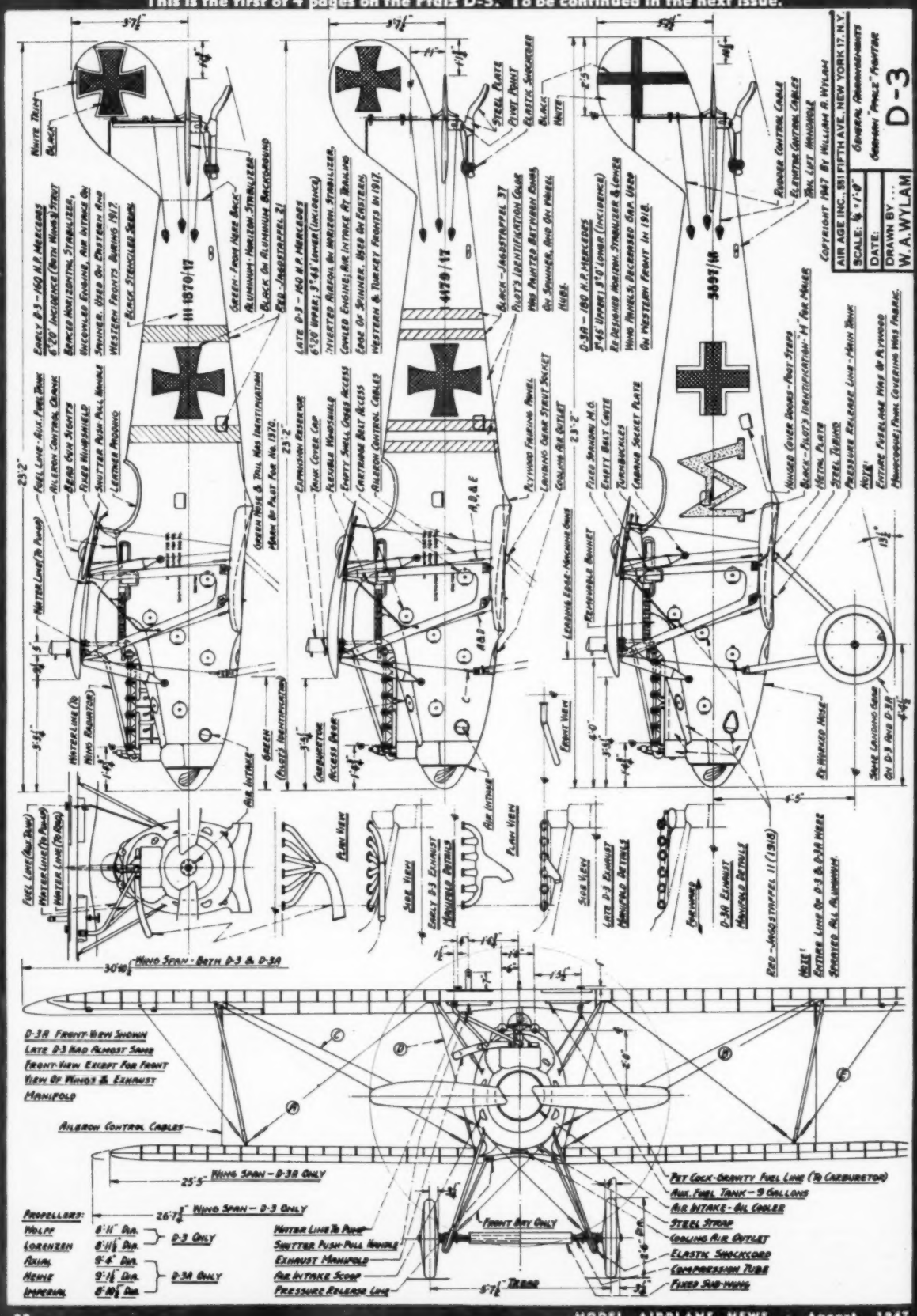
This is the first of 4 pages on the Pfalz D-3. To be continued in the next issue.


D-3
COPYRIGHT 1947 BY WILLIAM A. WYLAM
AIR AGE INC., 551 FIFTH AVE., NEW YORK 17, N.Y.
SCALE: 1/2" = 1'-0"
DATE:
DRAWN BY: W. A. WYLAM
GENERAL ARRANGEMENTS
GERMAN "PFALZ" FIGHTER
EARLY D-3 – 160 H.P. MERCEDES
LATE D-3 – 160 H.P. MERCEDES
D-3A – 180 H.P. MERCEDES
WHITE TRIM
BLACK
SCREEN - FRONT NOSE BACK
ALUMINUM - HORIZON STABILIZER
BLACK ON ALUMINUM BACKGROUND
RED - JAGDSTAFFEL 21
BLACK - JAGDSTAFFEL 37
PILOT'S IDENTIFICATION COLOR WAS PAINTED BETWEEN BOMS ON SPINNER, AND ON WHEEL HUBS.
STEEL PLATE
PIVOT POINT
ELASTIC SHOCKCORD
RUBBER CONTROL CABLE
ELEVATOR CONTROL CABLES
PILOT LEFT HANDGRIP
WATER LINE (TO PUMP)
FUEL LINE - AUX. FUEL TANK
AILERON CONTROL CHANNEL
FIXED GUN SIGHTS
FIXED WINDSHIELD
SHUTTER PUSH-PULL HANDLE
LEATHER PADDING
SCREEN HOLE & TAIL NOS IDENTIFICATION MARK ON PILOT PER NO. 1370.
EXPANSION RESERVOIR
RADIATOR COVER CAP
FLEXIBLE WINDSHIELD
EMPTY SHELL CHUTE ACCESS
CARTRIDGE BELT ACCESS
AILERON CONTROL CABLES
PLYWOOD FAIRING PANEL
LANDING GEAR STRUT SOCKET
COOLING AIR OUTLET
LANDING GEAR - MACHINE GUNS
REVERSIBLE BONNET
FIXED SYNCHRO M.G.
EMPTY BELT CHUTE
TURNBUCKLES
CANVAS SOCKET PLATE
HINGED COVER BOOMS - FOOT STEPS
BLACK - PILOT'S IDENTIFICATION - "A" FOR HALBERSTADT
METAL PLATE
STEEL TUBING
PRESSURE RELEASE LINE - MAIN TANK
NOTE: ENTIRE FUSELAGE WAS OF PLYWOOD MONOCOQUE; PANEL COVERING WAS FABRIC.
EARLY D-3 – 160 H.P. MERCEDES
LATE D-3 – 160 H.P. MERCEDES
INVERTED AIRFOIL ON HORIZON. STABILIZER.
COOLED ENGINE; AIR INTAKE AT BEHIND CONE OF SPINNER, USED ON EASTERN & TURKEY FRONTS IN 1917
D-3A – 180 H.P. MERCEDES
3'45" UPPER, 3'0" LOWER (INCIDENCE)
RE-DESIGNED HORIZON. STABILIZER & LOWER WING PANELS, DECREASED GAP. USED ON WESTERN FRONT IN 1918.
EARLY D-3 – 160 H.P. MERCEDES
6'30" INCIDENCE (BOTH WINGS) STRUT BRACED HORIZONTAL STABILIZER, UNCOOLED ENGINE, AIR INTAKE ON SPINNER. USED ON EASTERN AND WESTERN FRONTS DURING 1917.
BLACK STAGGERED SPARS
WATER LINE (TO RADIATOR)
AIR INTAKE
SCREEN (COLOR) IDENTIFICATION
CARBURETOR ACCESS DOOR
FUEL LINE (AUX. TANK)
WATER LINE (TO PUMP)
WATER LINE (TO BOX)
PLAN VIEW
SIDE VIEW
EARLY D-3 EXHAUST MANIFOLD DETAILS
LATE D-3 EXHAUST MANIFOLD DETAILS
D-3A EXHAUST MANIFOLD DETAILS
FAIRING
RED - JAGDSTAFFEL 11 (1918)
NOTE: ENTIRE LINE OF D-3 & D-3A WERE PAINTED ALL ALUMINUM.
WINDSHIELD
EMPTY BELT CHUTE
EJECTION HOLE
SKIDS LANDING GEAR ON D-3 AND D-3A
WING SPAN - BOTH D-3 & D-3A
D-3A FRONT VIEW SHOWN
LATE D-3 HAD ALMOST SAME FRONT VIEW EXCEPT FOR FRONT VIEW OF MANIFOLD & EXHAUST MANIFOLD
AILERON CONTROL CABLES
25'5" - WING SPAN - D-3A ONLY
26'7½" - WING SPAN - D-3 ONLY
PROPELLERS:
WOLFF 8'11" DIA.
LORENZEN 8'11½" DIA.
AXIAL 9'4" DIA.
HEINE 9'1½" DIA.
IMPERIAL 8'10½" DIA.
D-3 ONLY
D-3A ONLY
WATER LINE TO PUMP
SHUTTER PUSH-PULL HANDLE
EXHAUST MANIFOLD
AIR INTAKE SCOOP
PRESSURE RELEASE LINE
FRONT AXLE ONLY
PET COCK-GRAVITY FUEL LINE (TO CARBURETOR)
AUX. FUEL TANK - 9 GALLONS
AIR INTAKE - OIL COOLER
STEEL STRAP
COOLING AIR OUTLET
ELASTIC SHOCKCORD
COMPRESSION TUBE
FIXED SKID MOUNT

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Handley Page 0/400 bomber photographed in France ready for a flight

WORLD WAR I

by ROBERT C. HARE

NOVEMBER 1, 1916 was a memorable date for both the British Royal Flying Corps and the German Imperial Air Service. On that day a brand new bomber, the largest and most powerful of its time, took off from Cricklewood Airdrome in England and headed out over the English Channel on a delivery flight to the Front in France. It was to be tested under service conditions with a half a dozen others of the same type which were to follow in a few weeks.

Somewhere over the coast of France the new bomber ran into a bank of fog. The pilot, whose identity has been lost in the musty flight dispatches of W.W.I. tried flying blind by compass and ball turn indicator, became confused as he descended below the overcast far inland, and landed nearly out of fuel at what he thought was a friendly airdrome. Thus did the Germans capture intact, the first service test model of one of England's best W.W.I. "secret weapons"—the Handley Page bomber. To be sure, the Germans made the most of its design details in their subsequent Gotha and Friedrichshafen bombing planes.

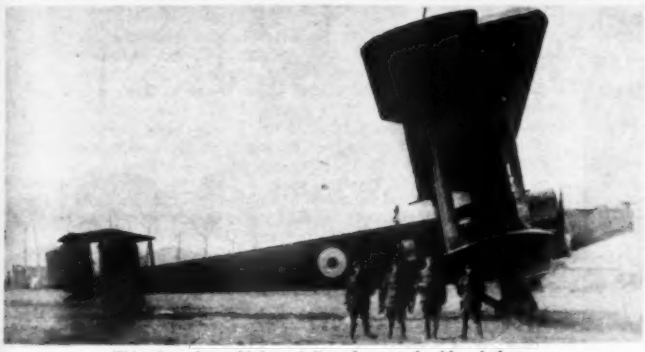
The name of Frederick Handley Page is as well known in pioneer British aviation as it is in connection with successful large airplanes. The firm of Handley Page, Ltd. got its start in 1909 producing aircraft incorporating features that demonstrated its founder's aeronautical farsightedness. Early H-P types were famed for their excellent stalling characteristics and inherent stability. Handley Page's experiments led to the post W.W.I. development of the well known slotted wing bearing his name, the forerunner of various types of leading edge slots used today to restore lift at low speeds to high speed airfoils. As early as 1910 he was theorizing in scientific papers on the need for boundary layer control.

But with England's embroilment in World War I, Handley Page found it necessary to drop his advanced ideas in favor of a practical application of already known facts. During 1915 his works at Cricklewood were engaged in manufacture and repair of accepted service types then in use; but his personal drafting table was the scene of numerous daily meetings with a picked group of engineers, the best brains in his organization. Out of this talent and meetings came the designs for England's first service type heavy bomber, the Handley Page 0/100.

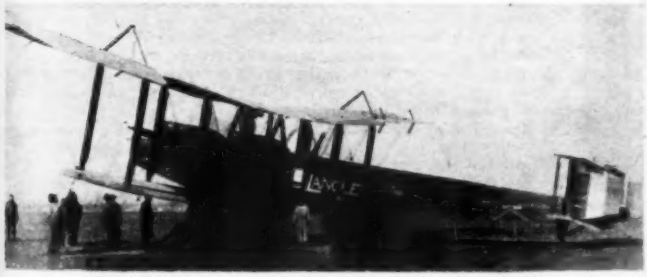
Design Aspects

When the first lines of the 0/100 were set down, specialized planes for bombing were as much an oddity as an airplane with twin tractor engines. Although British War Office specifications of 1915 merely requested designs of an airplane capable of carrying bombs over a short distance for *tactical* purposes, Handley Page, with his usual intuitiveness, foresaw the day when a large long-range bomber with twin engine reliability would be needed for *strategic* bombing. He reasoned that if bombing was to be effective at all, it must be done in quantity at enemy rear area points of supply. The necessity for long range was automatic in such a case, and to carry sufficient fuel and bombs to do the

(*Turn to page* 38)



This view shows biplane tail and gunner's side windows

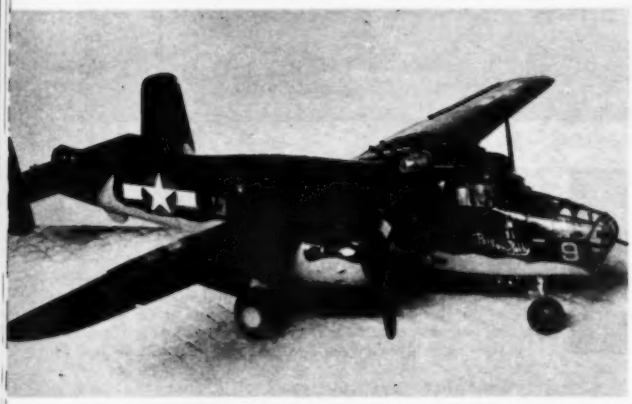


This *Langley* was first American built Handley Page bomber

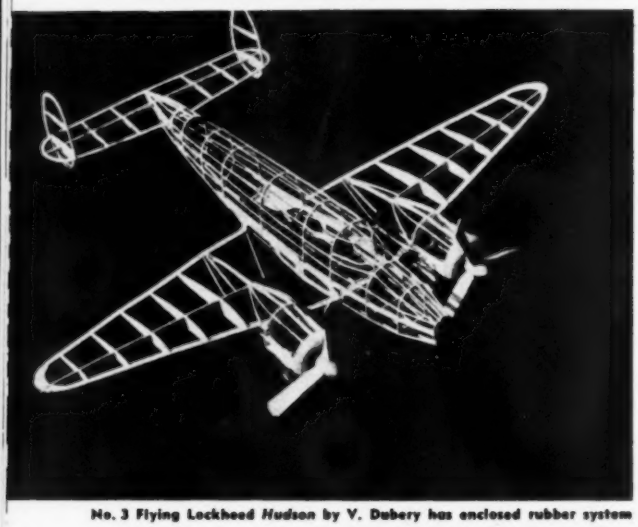
Unfolding the wings; right wings have just been opened and are being pinned

AIR WAYS

NEWS OF MODEL AIRPLANE EXPERIMENTERS FROM ALL OVER THE WORLD

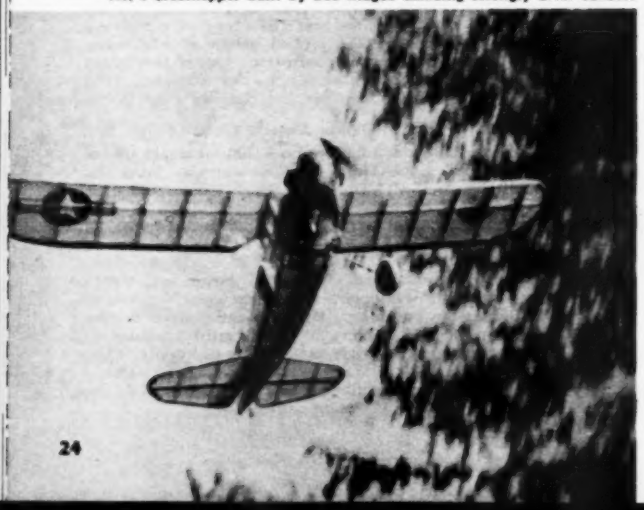


No. 2 Leroy Hubbard's B25 has many details that are found on big ones



No. 3 Flying Lockheed *Hudson* by V. Dubery has enclosed rubber system

No. 4 *Grasshopper* built by Bob Magee climbing strongly after takeoff



No. 1 8 foot *Buhl Pup* by A. Jamriska went O.O.S. on third flight

ANGLO-AMERICAN MODEL MEET.—No, this is not an announcement of the next Wakefields. However, competition is not dead between the fliers of this country and England. Followers of these columns will remember our announcement of a "Decentralized Meet" made in the August 1946 issue. This meet was held by mail between the *Pharos Model Flying Club* of Hillingden, Middlesex, England, and our *Cleveland Balsa Butchers*—it was won by the English fliers.

A similar meet is to be held July 6 (weather in both countries permitting) and results will be announced in "Club News." Flying will be conducted under AMA rules by teams of six fliers for each club, three in the rubber and three in towline glider events. While the challenge has just been issued, we feel sure the Pharos will accept. It is, of course, fully understood by all concerned that a contest of this sort is not necessarily a true measure of the ability of either fliers or models, due to such variables as wind, weather in general, quality of rubber and so on. Still, the friendly contacts made in this manner are priceless; techniques of flying and building can be compared and much learned by both sides, to the advancement of model flying in general.

We hope other clubs in our two countries, and in others as well, will try the same type of contest, and we offer the services of MODEL AIRPLANE NEWS to bring the various clubs together and publicize news of results.

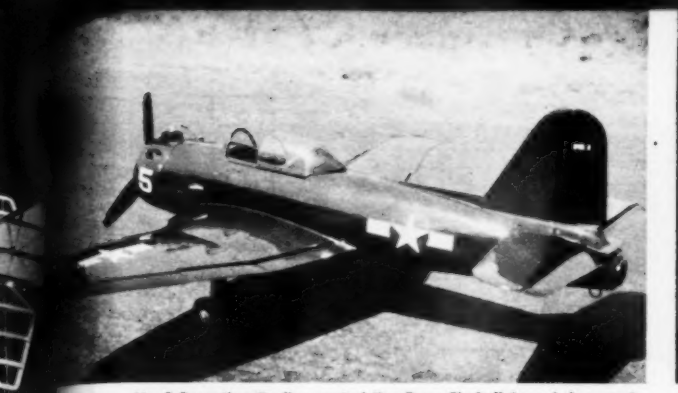
SUPER CONTROL LINE CENTER.—We hear from the *Capital City Controlaires* of Columbus, Ohio that they are completing a super control line center to be located at North Way Air Park. Their club has obtained a ten year lease to a tract of land 600 x 300 feet in which they are putting three circles, together with adequate pit space and room for spectators. One of the first jobs was the erection of a strong fence around the circle and pit areas.

The club stresses safety first, and next comes provision for the best possible flying conditions for the modelers. They have found the arrangement at their new location ideal because visitors can watch both model and full scale flying. Most important of all, with their ten year lease there is no chance that they will be ousted from the field as they have been from other sites. This appears to be a fine setup and we commend it to other groups who want to "settle down" and really get going. Why not get in touch with the airport authorities in your own vicinity?

EAST-WEST MEET.—News of the Western team has been well covered by Johnny Davis in our "West Coast Tips" column. Further news of the Western team will be found in "Club News" this issue. The Eastern team will be selected at finals to be held July 26 and 27 at Union, N. J. This is the *only* official meet to be held for the Eastern team. However, it is quite in order for other sections of the East to hold local eliminations in order that they may pick their best fliers to send to Union for the finals. Entries for the latter should be sent as soon as possible to Mrs. Frances Herbert, 259 Mamaroneck Ave., White Plains, N.Y. The entry fee is $5.00 per person and *all* funds thus received will go to defray expenses of taking the team to St. Louis.

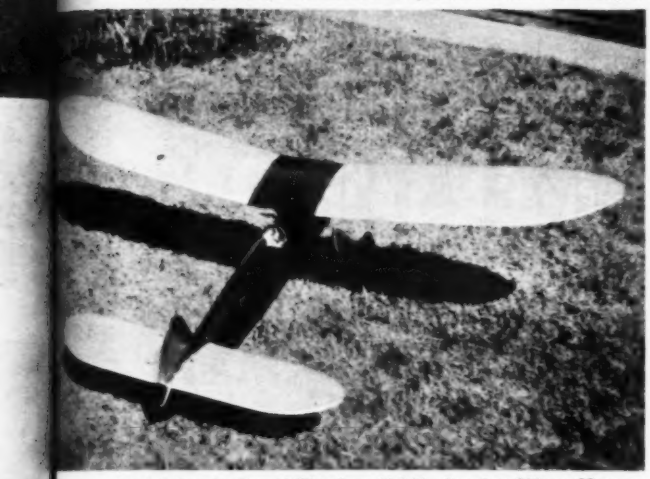
A RADIO CONTROL MEET.—The radio control event is usually the orphan at most contests. Entrants know it will take some time to get their equipment set up, so if they are in any other events (and they usually are) they try to get such events flown off first, and sometimes waste most of the day doing so. Then, too, the number of entrants in radio

(*Turn to page 70*)



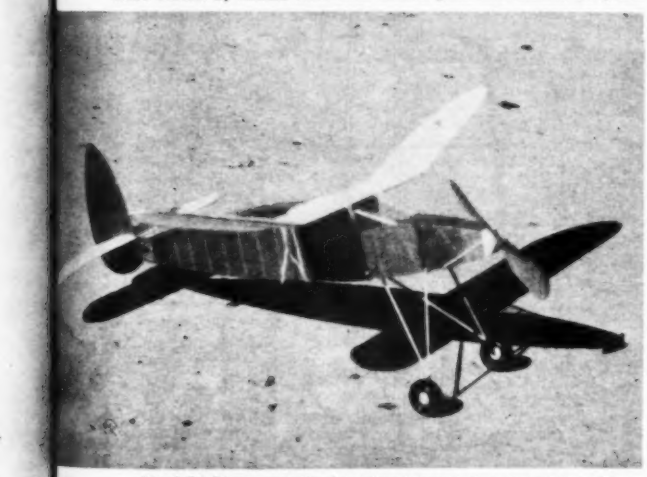
No. 5 Exceptionally fine control line Ryan *Fireball* from J. Larsen, Jr.

No. 6 Very successful glider built in Switzerland by P. Kelterborn

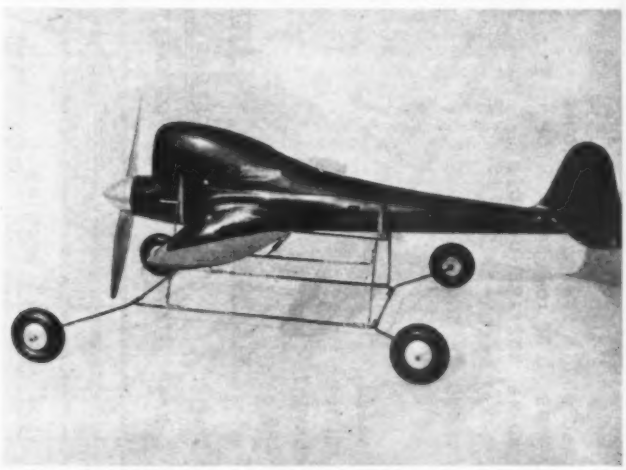


No. 7 *Falcon* by Ronald Flint from M.A.N. plans has Ohlsson 23 power

No. 8 Original control biplane by Don Boardman, photo by Floyd Lahue



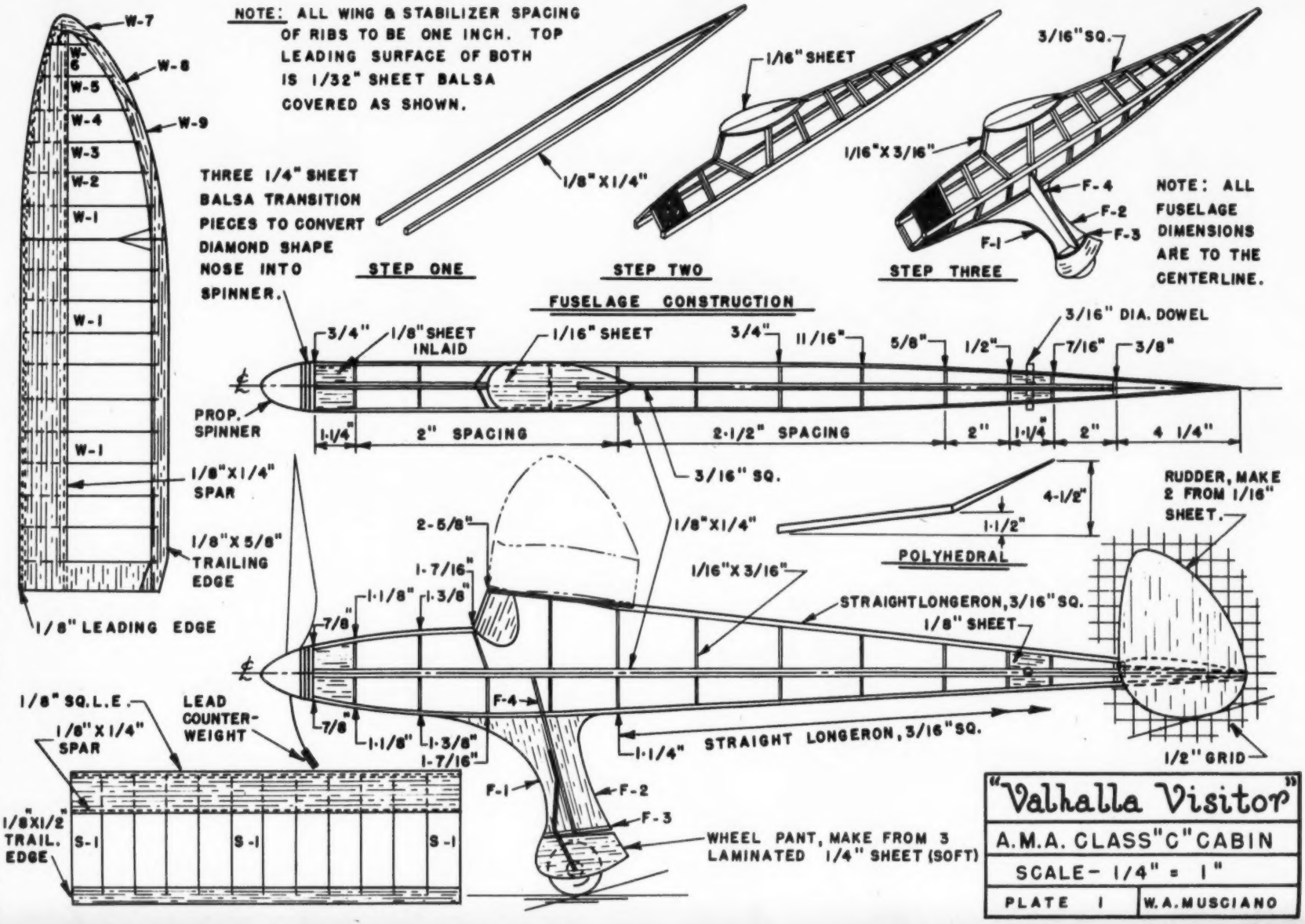
No. 9 Ed Dingerson's *Korda* pictured here before it had been flown



No. 10 Control speedster built by Art Cummins, photo by Art Snyder

No. 11 J. E. Cleland converted Scientific *Floe* to fly with CO_2 power

No. 12 Radio control glider built in France; photo from W. Hempstead



"Valhalla Visitor"

A.M.A. CLASS "C" CABIN	
SCALE - 1/4" = 1"	
PLATE 1	W.A. MUSCIANO

VALHALLA VISITOR

This sleek Class C rubber model uses the landing gear strut for dual purposes

by **WALTER MUSCIANO**

IT WAS the belief of the ancient Norsemen that all champions, after death, went to heaven which they called Valhalla. When you build and fly this champion performing model, you will find it has plenty of life and the climb will make you think it's heaven bound.

The *Valhalla Visitor* is a veteran of only one contest in which it was lost overhead in seven minutes. It placed third with a 3 min. 51 sec. average. Another has been built and flights average 3 to 4 minutes in calm morning air. The model was designed in accordance with the AMA rules for rubber powered class C planes.

An airfoil which presented the least resistance for a good climb yet allowed a flat glide was selected, namely the 6412 developed by NACA. Normally in a plane of this type the CLA would be high relative to the CG, because most of the weight is in the rubber motor. The landing gear fairing serves three purposes: (1) it lowers the CLA to a point slightly above and behind the CG; (2) the fairing is actually part of the fuselage, therefore its crossection can be added to that of the fuselage, bringing the total fuselage crossection to 9.38 sq. in.; (3) it eliminates the drag of a wire landing gear or the added weight or bother of a retracting mechanism. It will be noted on the plans that a shock strut has been incorporated to ease the strain in case an obstruction is hit when landing. The twin plate rudders keep the model upright when on the ground.

Construction of the wing and stabilizer is conventional, but the fuselage is a little different; however, some builders may find it easier than the side frame type.

After the plans have been drawn full size, pin down the two 1/8" x 1/4" hard strips over the fuselage plan view similar to crutch construction procedure, except that the crosspieces are omitted (see Step 1). Cement the 3/16" sq. top longeron into the notch on the 1/16" sheet wing platform, then cut the two 3/16" x 1/16" vertical uprights just below the wing mount and cement to the 1/8" x 1/4" crutch. Mount the 3/16" sq. longeron between the uprights and the rear of the fuselage. When this is dry, fill in with the remaining uprights and complete the front end of the fuselage as shown in step 2 using plenty of cement. Let dry overnight and remove from the table. Install the lower 3/16" sq. longeron using the same method, except the model will be held in the hand instead of being pinned down. When dry, sandpaper the entire frame and add bulkhead F-4 after the landing gear wire has been attached to it.

Cement F-1 and F-2 on either side of F-4 to be followed by F-3. The three pieces of 1/4" sheet balsa in the nose are added next. They should be carved and sanded to transform the diamond shape to a circular one at the spinner. Cut a 3/4" square hole in the center of the nose piece and the nose plug should be a snug fit. The celluloid cabin is now added. It should cover the entire space between the wing mount and the 1/4" x 1/8" longeron and between the 1/16" x 3/16" uprights. When covering the model, the tissue can be cut away to give the cabin its proper outline shape. Cover the landing gear strut first. The original was covered with lightweight Silkspan applied wet and stretched until all wrinkles disappear. Now install the balsa wheel plant.

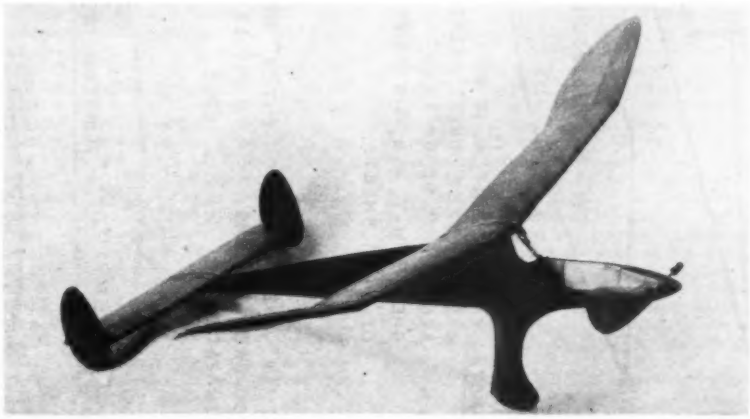
A folding propeller and a rubber tensioner should be used. Many models are ruined by the unwound rubber motor bunching in the fuselage, throwing the ship into a violent stall or spiral dive. The additional time spent making a rubber tensioner is well rewarded. The counterbalance arm on the propeller should be sweptback, as shown on the plan, to eliminate vibration.

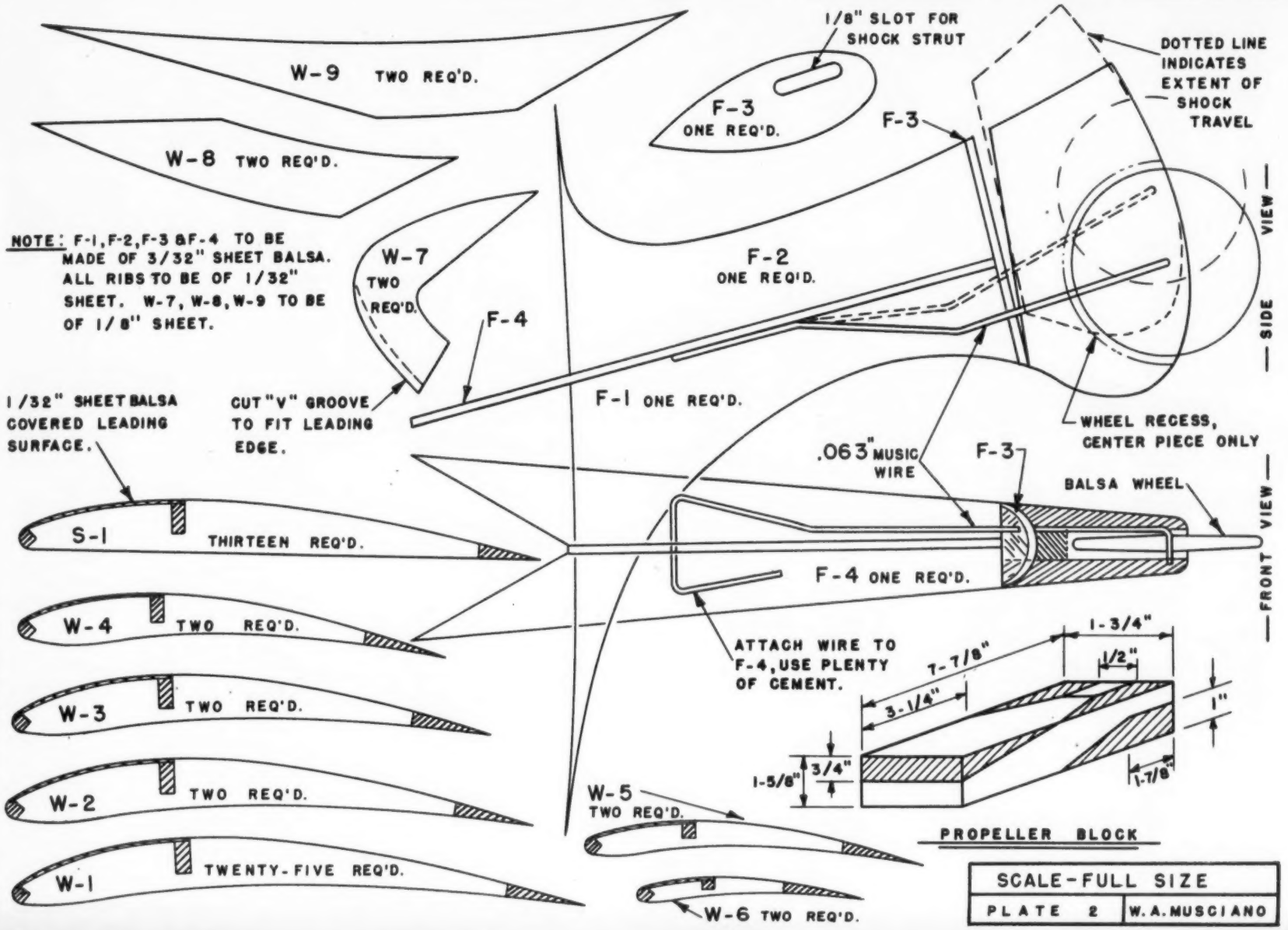
The wing and stabilizer are attached with rubberbands. 1/16" dia. dowels are pushed through the fuselage protruding 1/4" near the leading edge of both wing and stabilizer. The rubber is looped around these dowels and over the wing and stabilizer.

Wing incidence is built-in, but 1/8" positive incidence should be set in the stabilizer. The thrust line was offset to the right 3/32" with no down thrust at all. One of the rudders should be set to make the plane glide to the left. 16 strands of 3/16" flat brown rubber with 3-1/2" of slack is recommended.

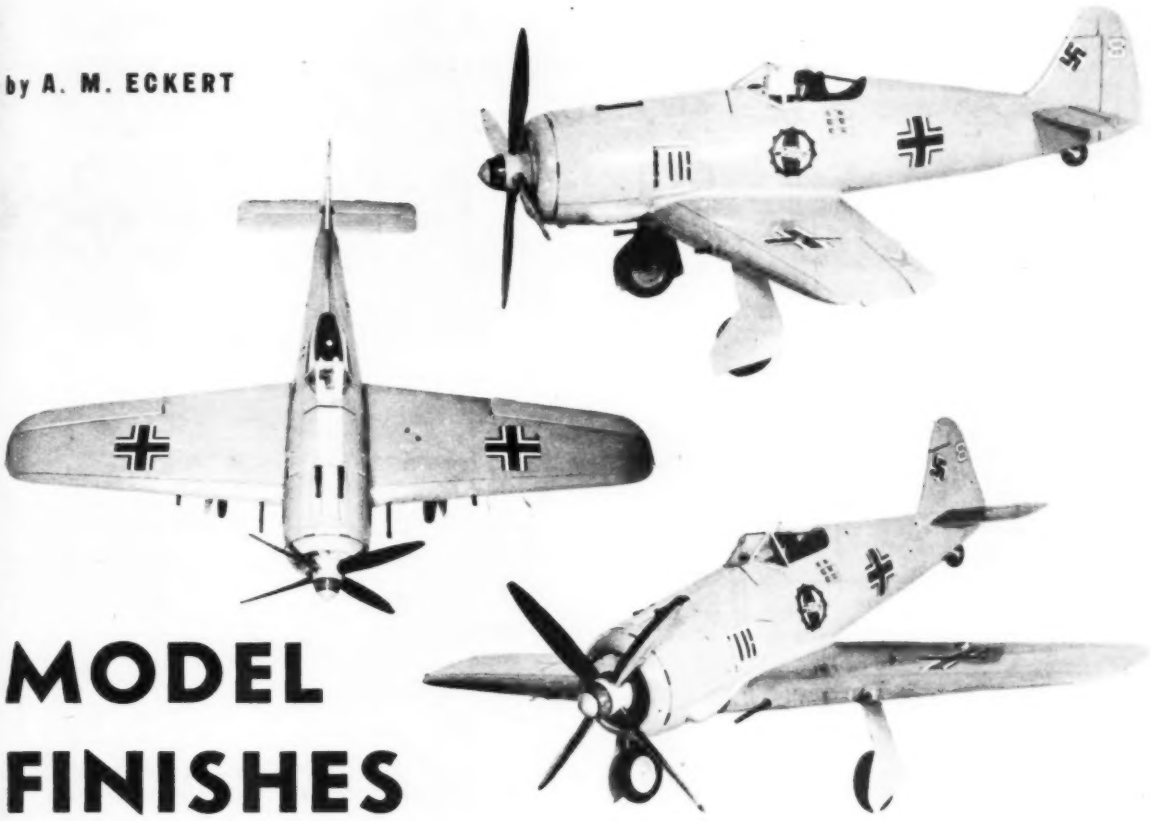
Before powered flight is attempted, the model should be hand glided dozens of times to insure a flat glide with a slight left turn. When this is accomplished, wind about 150 turns and attempt a hand launched flight. Power should be gradually increased if all adjustments are correct. The prototype climbed almost straight with a glide to the left. The present model climbs to the right and glides to the left.

Principal characteristics of the design are: 36" span, 4-1/2" chord, 145 sq. in. wing area, 50 sq. in. stabilizer area, 30" fuselage length, 4-1/2 oz. weight.




W-9 TWO REQ'D.
W-8 TWO REQ'D.
W-7 TWO REQ'D.
NOTE: F-1, F-2, F-3 & F-4 TO BE MADE OF 3/32" SHEET BALSA. ALL RIBS TO BE OF 1/32" SHEET. W-7, W-8, W-9 TO BE OF 1/8" SHEET.
1/32" SHEET BALSA COVERED LEADING SURFACE.
CUT "V" GROOVE TO FIT LEADING EDGE.
S-1 THIRTEEN REQ'D.
W-4 TWO REQ'D.
W-3 TWO REQ'D.
W-2 TWO REQ'D.
W-1 TWENTY-FIVE REQ'D.
W-5 TWO REQ'D.
W-6 TWO REQ'D.
1/8" SLOT FOR SHOCK STRUT
F-3 ONE REQ'D.
F-2 ONE REQ'D.
F-4
F-1 ONE REQ'D.
DOTTED LINE INDICATES EXTENT OF SHOCK TRAVEL
F-3
SIDE VIEW
WHEEL RECESS, CENTER PIECE ONLY
.063" MUSIC WIRE
F-3
BALSA WHEEL
F-4 ONE REQ'D.
FRONT VIEW
ATTACH WIRE TO F-4, USE PLENTY OF CEMENT.
1-3/4"
1/2"
1-7/8"
3-1/4"
1"
1-5/8"
3/4"
1-7/8"
PROPELLER BLOCK
SCALE-FULL SIZE
PLATE 2
W. A. MUSCIANO

by A. M. ECKERT



MODEL FINISHES

A COMMON paraphrase of the paint and wood finishing industries is: "With enough good paint you can always live in a new house." Truer words were never spoken, for no other process has the magic touch and eye appeal offered by this miracle of decoration.

Since scale models are built for beauty as well as accuracy of construction, common sense tells us that both operations must be performed with precision and care. We have all at sometime or another heard a builder lament the fact that he has an atrocious paint job, and that it ruined all his long hours of toil at construction. However, with a little know-how of painting he could have produced something equal to a "factory job" finish.

PAINT—Paint substances of a permanent nature may be generally divided into two categories: oil paints and spirit paints. Oil paints are composed of linseed oil, turpentine, pigment and drier. Spirit paints such as dope and lacquer are made of pyroxylin, alcohol and pigment. Both types have definite advantages, depending on the use made of them. The present day composition of spirit paints makes them highly satisfactory when articles may be either sprayed with or dipped into it. It dries rapidly and thus cannot be applied smoothly with a brush. For this reason it is not suitable for delicate scale model painting. Oil paints usually dry in 24 to 48 hours, depending on weather and temperature conditions, are easily applied and controlled by brush, and set slowly enough to allow time for correction of errors. They are easily mixed and blended and are recommended for exclusive use in this field of modeling.

Only enamel should be used since flat paints are not receptive to the rubbing and polishing processes. Choose only dependable high grade products because cheap paints fade easily, lack sufficient drier, and have poor quality pigment. Since you will occasionally find it necessary to mix and match colors, it is advisable to adopt one brand of paint and become familiar with the available shades.

Metallic paints are made from powdered metals such as brass, copper, zinc or aluminum and are mixed with varnish or banana oil for application. They are sold in various grades ranging from No. 1000, which is relatively coarse in pigment or powder content, to No. 10,000 which is the finest. For best results use the finest grade available.

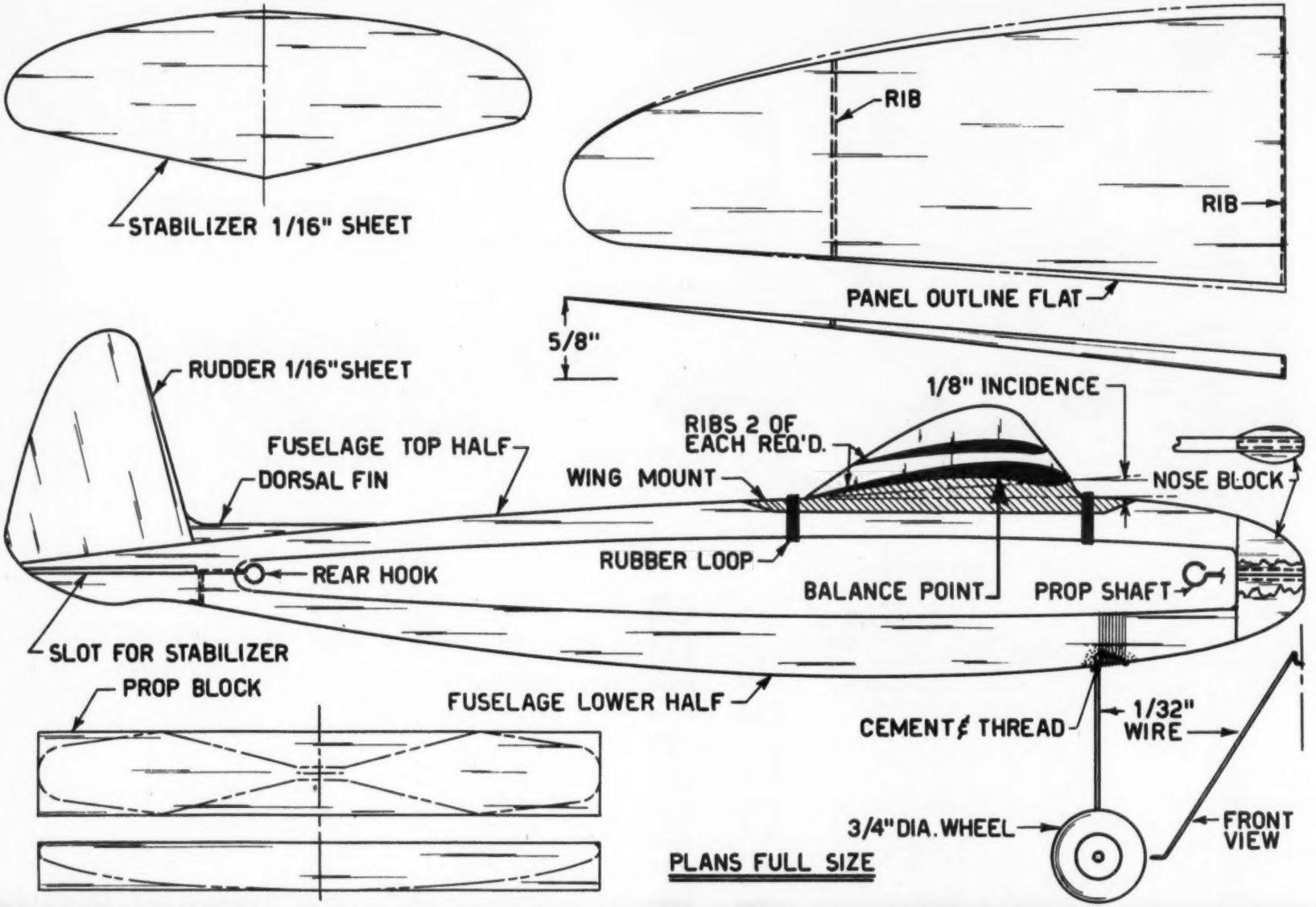
BRUSHES—To do good painting you must use good brushes. Cheap brushes lose their bristles, hold insufficient paint, leave brush marks, and serve only to complicate matters for you. When you invest in good brushes such as those made from sable, camel hair or ox hair, you save money and have something that will give satisfactory results for years. For all around purposes a good selection of brushes is one each of the following: 3/4" flat, 1/4" flat, 1/4" round, and 1/8" round. This combination will accommodate your large flat surface painting as well as irregular surfaces and striping requirements.

Brushes should never be allowed to dry out hard as this practice helps to deteriorate the bristles and makes cleaning difficult. Tiny hard particles of paint will remain in the heel of the brush and will work loose during painting and mar your work. Either clean the brush thoroughly after using or suspend it in a small jar partially filled with the solvent peculiar to the type paint you are using. Clean with turpentine or carbon tetrachloride after using oil paint; alcohol after using lacquer; acetone after using dope.

WOOD—A reasonable understanding of the properties and quality of the wood you are about to paint will help you do a better job. Assuming you have used a soft wood such as balsa, sugar pine or basswood (linden), we find that it will fall into the close-grain soft wood category. Such a wood absorbs paint readily, therefore it is necessary to seal off the open wood cells with a liquid filler. The filler not only retards absorption of the paint but fills the tiny pits in the wood so that the surface may be leveled. Shellac and clear dope are both good fillers, and two to three coats sanded dry with 5/0 grade sandpaper after each application will produce a glass smooth surface on all the above woods except balsa. Because of its extreme porous characteristics, balsa is usually filled with a paste filler and sanded.

COLOR AND DESIGN—For those who

(*Turn to page* 59)


STABILIZER 1/16" SHEET
RIB
RIB
PANEL OUTLINE FLAT
5/8"
RUDDER 1/16" SHEET
1/8" INCIDENCE
RIBS 2 OF EACH REQ'D.
FUSELAGE TOP HALF
DORSAL FIN
WING MOUNT
NOSE BLOCK
REAR HOOK
RUBBER LOOP
BALANCE POINT
PROP SHAFT
SLOT FOR STABILIZER
PROP BLOCK
FUSELAGE LOWER HALF
CEMENT & THREAD
1/32" WIRE
3/4" DIA. WHEEL
FRONT VIEW
PLANS FULL SIZE

MODEL AIRPLANE COURSE FOR BEGINNERS

A CAREFULLY PLANNED AND TESTED SERIES OF ARTICLES FOR BEGINNERS IN THE ART OF BUILDING AND FLYING MODEL PLANES

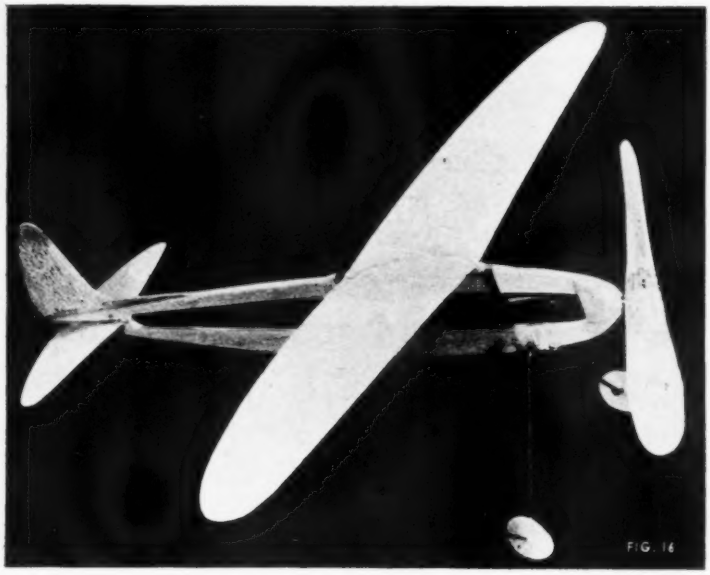
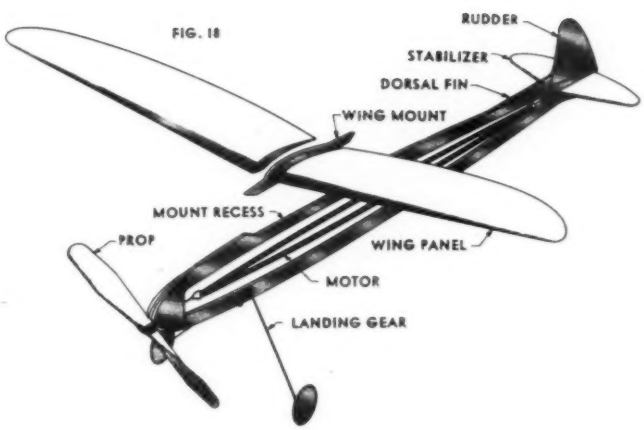


FIG. 16



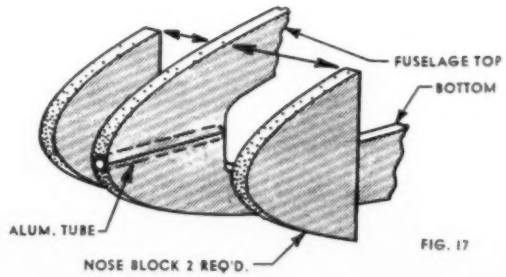


FIG. 17

LESSON 4—Build and Fly An All Balsa Profile Model

THE airplane in Fig. 16, designed for this month's beginner project, is known as a "profile model." Constructed entirely of balsa sheet it resembles a contest ship of frame work construction. Its name is derived from the fact that only the side view or profile contours of the fuselage are used in the miniature, although the frame is actually of built-up type. Capable of remarkable flight performance, the craft should prove almost indestructible because of its simple but rugged construction.

Materials Required—1. A sheet of 1/8" thick hard balsa for the fuselage, wing mount and nose blocks.

2. Two pieces of 1/32" thick sheet balsa, 2-1/4" x 5-1/2" each—for wing panels.

3. A piece of 1/16" thick medium hard sheet balsa for the ribs, rudder and stabilizer.

4. A medium hard block of balsa 4-1/4" long, 5/8" wide and 3/8" thick for the propeller.

5. A pair of 3/4" dia. balsa wheels (optional because they may be made of 1/8" sheet).

6. One piece of aluminum tubing for thrust bearing 1/2" long and 1/16" outside diameter. Inside diameter to be sufficient to receive 1/32" wire.

7. A length of 1/32" music wire for landing gear, prop shaft and rear hook.

8. A small bead or 2 washers to be used on the prop shaft.

9. An 18" length of 1/8" flat brown rubber for power and for wing fasteners.

10. A small tube of model airplane cement.

11. A short length of thread.

Tools Required—1. A sharp knife; 2. razor blade; 3. long nose pliers; 4. wire cutting pliers or snippers; 5. package of varied sandpaper; 6. ruler; 7. pencil; 8. scissors; 9. pins; 10. carbon paper. The above tools are similar to those used for the previous model.

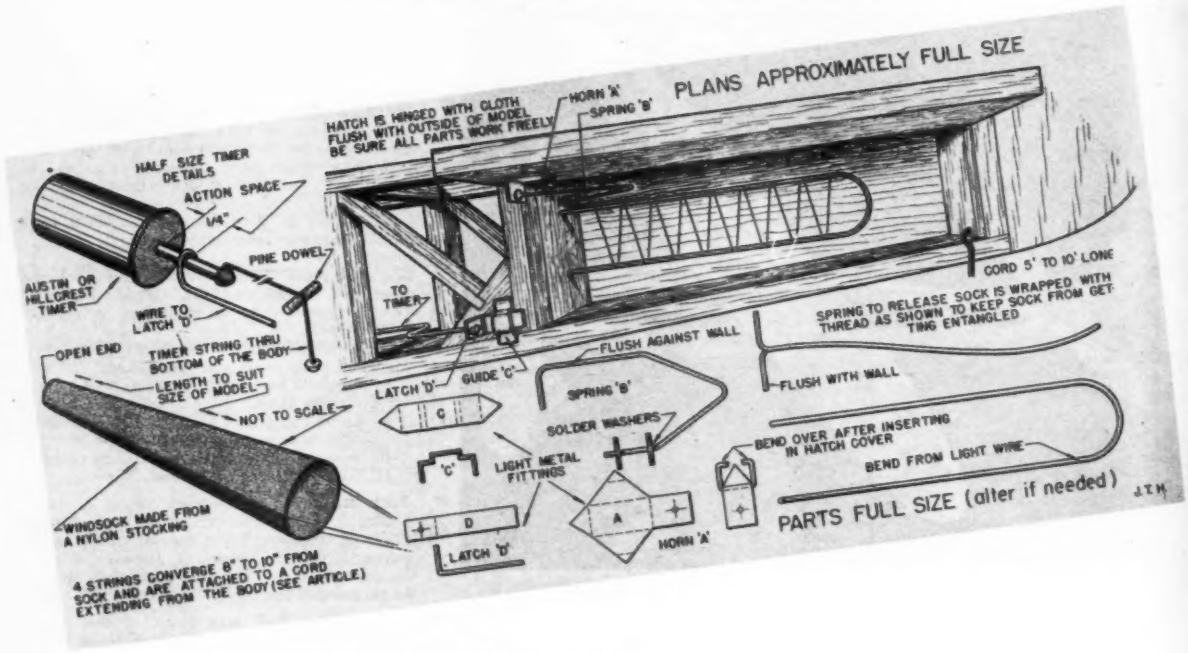
Construction—Full size plans of the model appear on page 38. These, in addition to the perspective sketches, adequately show construction of the model. Transferring the plans onto the balsa is accomplished by using carbon paper between the printed plan and the wood in much the same manner as described in our second lesson.

Fuselage—The fuselage is made of four pieces of 1/8" thick sheet balsa. These consist of two nose blocks and the upper and lower portion of the fuselage. Trace the outline of each section and cut out with knife or razor. Sandpaper the "cut" edge to the pencilled outline. After these pieces are finished, sandpaper a half round groove in the front end of the fuselage upper and lower section. This is intended to receive the aluminum tubing used as thrust bearing. Cement the tubing into place as shown in Fig. 17 and join the fuselage sections. Make certain however that the rear hook has been formed and inserted into position as shown before cementing the sections together. Care must be used to prevent cement from seeping into the slot intended to receive the stabilizer later in the construction process. After the cement has hardened on the body frame, glue the nose blocks into position. These are to reinforce the front or nose end of the fuselage and to prevent the thrust bearing from tearing off. Sandpaper the nose as shown in plans. A light sandpapering may also be given to the sharp edges of the fuselage frame outline. The recess cut on the top half of the body for positioning the wing must be perfectly straight and true in both the lateral (wingtip to wingtip) and longitudinal (fore and aft) plane.

Tail Surfaces—Trace the rudder and stabilizer outline onto the 1/16" thick sheet balsa and

(*Turn to page* 61)

WHY *LOSE* YOUR SHIP?


PLANS APPROXIMATELY FULL SIZE
HATCH IS HINGED WITH CLOTH FLUSH WITH OUTSIDE OF MODEL BE SURE ALL PARTS WORK FREELY
HORN 'A'
SPRING 'B'
HALF SIZE TIMER DETAILS
ACTION SPACE
1/4"
PINE DOWEL
AUSTIN OR HILLCREST TIMER
WIRE TO LATCH 'D'
TO TIMER
CORD 5' TO 10' LONG
SPRING TO RELEASE SOCK IS WRAPPED WITH THREAD AS SHOWN TO KEEP SOCK FROM GETTING ENTANGLED
OPEN END
TIMER STRING THRU BOTTOM OF THE BODY
LENGTH TO SUIT SIZE OF MODEL
NOT TO SCALE
LATCH 'D'
GUIDE 'C'
FLUSH AGAINST WALL
SPRING 'B'
FLUSH WITH WALL
SOLDER WASHERS
BEND OVER AFTER INSERTING IN HATCH COVER
BEND FROM LIGHT WIRE
'C'
LIGHT METAL FITTINGS
WINDSOCK MADE FROM A NYLON STOCKING
D
A
LATCH 'D'
HORN 'A'
PARTS FULL SIZE (alter if needed)
4 STRINGS CONVERGE 8" TO 10" FROM SOCK AND ARE ATTACHED TO A CORD EXTENDING FROM THE BODY (SEE ARTICLE)
J.T.H.

by DUTCH HESS

It isn't necessary to lose your ship to win a meet — try this de-thermalizer

"HEY, you're in one!" How many times have you heard that phrase at a Free Flight meet when someone hooks a nice thermal? Then comes a fast run to your car and a merry chase. When the lucky (or unlucky) flyer returns, you ask him the inevitable question: "Did you find it?" And all too many times the answer is negative. (A blind road, a freight train, or she got so high you couldn't see it any more.) And so there is another good contest ship out of circulation. Sure, maybe it will be found next fall when the farmers husk their corn, *but*—look at all the swell meets coming up which you could have entered with your "pride and joy."

During the past season here in the Chicago area there were plenty of Free Flight meets, plenty of contestants, and the author saw plenty of good ships drift away on thermals. At our meet alone (DeKalb) there were 15 ships lost out of 97 entries in all classes. Even at this late date we are still having a few returned, but they were lost through the best part of the contest season.

Yours truly lost 2 ships: a Class A job built for an *Atom* and powered with a *Bantam* which was lost on its first test flight but later returned; and my Class C job which I have finally marked off as lost for good. The first job had no de-thermalizer; the other had one but I didn't use it since the timer string had broken and I didn't take time to fix it. As a rule the flyer who uses a de-thermalizer seldom loses his ship. By using one you not only feel fairly sure of getting your model back, but it gives you a better chance of getting all 3 of your flights in.

A goodly number of modelers use Goldberg's "Cock up" stabilizer as a de-thermalizer, and it is a proven success. I know that spoilers are used, but the ones I've seen were not too successful. As for myself, I've fitted all my ships with a wind sock kicked out at the rear of the plane, and fellows, it really pulls them down. It swings your ship out of its tight thermal circle into a wide one which, plus the extra drag set up by the sock, pulls the ship down to a normal three point landing.

All you need is a good timer which can be set at from 5 to 20 mins., a few pieces of hardware (which you can make yourself), and the wind sock. The sock is nothing more nor less than just that. Take one of your wife's or sister's nylons, cut the foot off, and run a "B" guitar string around the top of the stocking through the hem; solder the ends of the guitar string together and you have a sock that will snap open when released. Tie strings at 4 evenly spaced places to the top of the sock around the wire loop, and bring up to a point about 8" above the top of the loop. Tie a good strong thread or string to these, and fasten the other end to the de-thermalizer compartment in your plane. I use 5 or 6 ft. of string on Class C jobs, and comparatively shorter string for smaller planes. You will find you can fold your guitar string hoop into 2 loops by folding it into a figure "8" first, then folding the 2 circles together. Fold the sock accordion-wise up against this loop, then wrap the main string around the whole thing. This can then be placed into the compartment.

When your trap door flips up, the sock comes out, unrolls, snaps open, and there you are. Just to play safe, I bend a light piece of music wire in such a way as to kick the wind sock out.

Several members of our Club are using my de-thermalizer, and it has proven itself foolproof. As it is fastened in no way to the stabilizer, it leaves that part easily removable for transportation. But the main thing is: regardless of what type you may choose, use a de-thermalizer!

K & B TORPEDO Announces

Special 1947 Nationals Awards

to every contestant winning a first place in the 1947 Nationals with a K & B Torpedo Engine. The K & B Mfg. Company will award a CASH PRIZE OF $50.00 — A NEW K & B ENGINE — ONE YEAR'S FREE SERVICE ON SAME.

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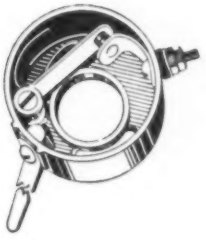
Speaking of the Nationals (or any other contest, for that matter) the K & B TORPEDO will really put you in the top bracket. In every contest K & B Torpedo is always among the top winners.—It's the hottest engine in the air in its class.

LOOK at these OFFICIAL AMA RECORDS

Class III open U Control Speed—102.85 MPH by Tony Naccarato at Los Angeles. Free Flight R.O.W. B Jr. by Jack Butler, Inglewood, Calif.—Free Flight R.O.W. B Sr., by Lew Mahiew, Long Beach, Calif.

QUICK GET-AWAY



in competition is important to every contestant. That is what the exclusive K & B Torpedo less-than-3-minute, fully enclosed timer point adjustment gives you. To adjust points simply loosen nut (see illustration at right) on back of timer case, adjust points with screw driver, tighten nut to secure adjustment and you're ready to go.

Features and Specifications

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AVAILABLE ACCESSORIES

High Compression head	$1.25
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2 cycle rotary valve. .725" Bore. .724" Stroke. .299 cu. in. displacement (Conforms to A.M.A.)

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WEST COAST TIPS

by JOHNNY DAVIS

CONTEST DOPE—We are now in the midst of a real contest season, with a big or little meet of some kind almost every week, and again comes the old bugaboo about hot weather and windy days. When will some bright young man, or smart group of model builders, take advantage of this California climate to hold contests in the winter time? About the only group who consistently do so is the San Diego boys, although once in a while the Bay area crowd conducts a meet in October or September. But it seems to us that one of the biggest and most talked about meets in the past was the one held in April 1946 by the *Lockheed Club*. That was the first big meet of the year, and it really brought out a lot of the hibernators.

To our way of thinking, somebody ought to put on a big meet every year in January or February, because that is the time when the atmospheric conditions are really ripe for engine runs.

INCIDENTALLY, while touching on the *Lockheed Club*, it saddens us to report the passing of one of the model game's most illustrious clubs. Due to lack of a place to fly (recently prohibited in Los Angeles playgrounds), as well as loss of many of their topflight modelers through moving and the rather grim necessity of earning a living, the *Lockheed Club* is on the verge of disbanding as an active group. Most of its stars or outstanding members were originally employed by the Lockheed Corp. and did war work throughout the war. They banded together through a common interest. But now that the war is over, and cutbacks are upon us, the majority of the club's members have been forced to find other employment; consequently many have moved, or their hours of play have been changed or lessened, and members present at recent meetings have become less and less.

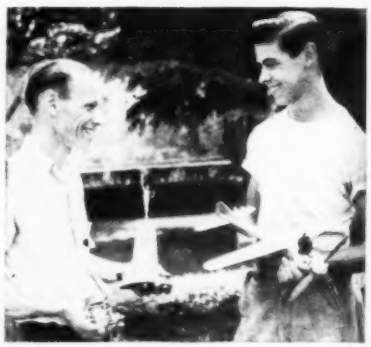
At one time you could go to a *Lockheed Club* meeting and see more beautiful flying scale models and more fast and beautifully painted speed jobs than you would find at the biggest contests. The members took extreme pride in the excellence of their work. Ced Galloway, one of the leading members, won almost every major contest for a solid year with his famous F-4-B-4 Boeing, of which numerous pictures have appeared in this column.

Art Cummings who won the Senior Precision event at the '46 Nationals was a member, as was Jack Schauble, former speed king of the Coast in '45. The entire "Snafu" team, team flyers and precision experts par excellence, were also members of the Club. Rex Bloome, who devised the present nationally accepted means of determining the amount of pull a speed job must be able to withstand, and Carter Moore one of the oldtimers in the model field were both past presidents and leading lights of the Club.

But now the Club is in process of disbanding, just when it should be getting bigger. We still think it could be a great group if it weren't for a few shortsighted individuals who work for the City. However, maybe it will at least serve as a lesson to other groups who are still active and want to stay that way.

Own your own flying field!

THE ANAHEIM MODEL group threw a contest at Crawford Model Airport, April 20. Because of rain clouds threatening the turnout wasn't as good as expected, but by midafternoon the boys began to cook. Interesting sidelight is that the real fast speeds turned in Class B (.031 to .50) with the new times being turned in by the old Class C hot shots. Following are the results:



Keith Conrad holding his *Golden Torpedo*, which flew over 100 mph with a K & B Torpedo engine. His father Leighton holds trophy and engine the model won at 1946 Western Open

		Speed
CLASS C SPEED		
Bob Van Natta	Long Beach	116.50
Leonard Olson	San Diego	114.28
Richard Allen	Los Angeles	111.87
CLASS B SPEED		
Don Newberger	Long Beach	121.29
Keith Storey	Pasadena	118.26
Wally Wallick	Long Beach	114.50
CLASS A SPEED		
Ed Miller	Los Angeles	94.24
Les McBrayer	Alhambra	92.11
Gerald McDonald	Los Angeles	80.82
JR. CLASS C SPEED		
Ray Benskin	Pomona	102.38
Tom Davey	Los Angeles	89.10
JR. CLASS B SPEED		
Bob Keech	Anaheim	81.11

Some of the models entered at First Meeting of Southern California Congress, held under auspices of Lockheed Club. Congress claims many former Lockheed model stars

TEAM STUNT
Bob Palmer and J. C. Yates; Snafu No. 2; Snafu No. 1; K. E. Wade and Bob Keech.
PRECISION
Bob Keech; J. C. Yates; Norman Morgan; Jim Saftig.
FLYING SCALE
J. Burris, D.C.-3; J. Burris, P-38.

ANOTHER LARGE contest was thrown by *Los Angeles Aero Modelers* on May 4. Practically the same men won the Los Angeles contest as won the Anaheim meet, but the places were juggled:

CLASS A SPEED

Les MacBrayer	100.00	
Don Miller	86.58	
Arthur Shane	79.75	
Willy Gregson	58.93	OFFICIAL (New AMA Record Class I—Senior)

CLASS B SPEED

Keith Storey	124.22	OFFICIAL (New AMA Record Class V—Open)
Don Newberger	120.00	
Wally Wallick	115.28	

CLASS C SPEED

Don Newberger	122.86
Wally Wallick	122.03
Allan, Kitchens, & Dunning	120.00

JR. SPEED EVENTS

Bob Keech	106.95	OFFICIAL (New AMA Record Class 5-Jr.)
Ray Benskin	104.65	OFFICIAL (New AMA Record Class 6-Jr.)

PRECISION
Ed Lansberg; Bob Palmer; Bob Behrens.
TEAM STUNT
Bob Palmer and J. C. (Madman) Yates; Snafu No. 1; Bob Watson, Bot Thulin.
JR. PRECISION
Bob Keech; Jack Gilroy; Bud Jamieson.
LADIES' EVENTS
Marjorie Hutcheons; Violett Jarrett.

As the above records show, this meet produced four new AMA official records. These were witnessed by the required AMA timers and contest director, and were run off on pylons as were almost all the speed events.

Interesting to note was the fact that one of our "ships came in." Keith Storey has finally caught up with the high touting we have been giving him and he is now one of the leading contenders for national championship honors. He holds the Class 5 record, and we are going way out on a limb to predict that he will set at least one more record this year in another class. We will even name it—Class I Open. Here's hoping anyhow.

Model Sky Skooter

(*Continued from page 9*)

it on your finger tips one-third back of the leading edge at wingtips. If necessary add BB shot to tail to bring ship to level balance.

FLYING—Select a calm day and a grassy field. Glide over tall grass; using tail surface controls to trim. Start motor, setting it to run as slowly as possible and to cut out in 5 or 10 seconds. Increase motor speed gradually and try takeoffs. Never attempt to get high speed flight and rocket climb from a scale model; rather just let it cruise along in slow circles using motor run to fit conditions (I mean, to avoid thermals!) and many hours of pleasure flying plus the knowledge gained will be your reward.

CONVERSION — Using heavier structure, the model may be made into a stunt U-control ship, at the same time retaining the exact scale proportions.

As a very large (6 ft. plus) model (8 times the magazine drawing) suitable for radio control, a few changes may be necessary. I suggest the motor be mounted at the wing leading edge and an extension shaft used. The fuselage should be cut to fit ½ its scale width, and the C.G. properly placed in relation to C.L.A. See Maestro Charlie Grant's articles in previous M.A.N. issues or his book "Model Airplane Design" for dope on this.

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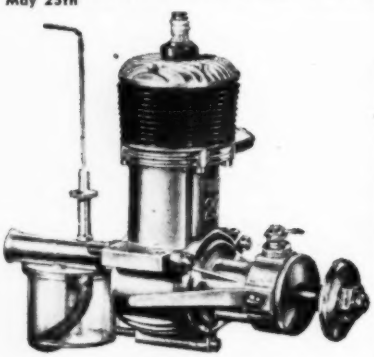
powered W. T. Thomas' plane in its official Class 3 Senior Record Flight of 98.86 m.p.h., at Daytona Beach, May 4th. First also in the Class 3 speed event of the Chicago U-Liners, May 25th



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LATEST FROM THE

ACADEMY OF MODEL AERONAUTICS

by Executive Director **RUSS. W. NICHOLS**

IN a communication just received at AMA Headquarters, A. F. Houlberg, Chairman of the Society of Model Aeronautical Engineers, writes in part:

"We have just held a council meeting of the S.M.A.E. on the subject of this contest (International Wakefield competition) and it is our concerted opinion that it is not practical to run a contest for the Wakefield trophy in 1947, and certainly not during the month of August."

There appear to be several reasons why this decision was made by the council. Foremost is the extremely difficult traveling conditions which, coupled with the fact that a relatively short period of time remains in which to organize teams and reserve traveling space, indicated that it would virtually be impossible for either the British or other countries interested to make certain that their teams would be able to compete.

Accordingly, the AMA Wakefield Committee is now working directly with the S.M.A.E. Council on all arrangements for the contest in 1948 so that all announcements can be made either at the end of 1947 or early in 1948. This is calculated to give everyone concerned the required time to build models, make transportation arrangements, and to make certain that all interested national aero clubs are supplied with pertinent information. In addition, Mr. Houlberg feels that such a plan "will also give you the opportunity of placing the contest on the F.A.I. international calendar, and this alone will give the contest a much better standing and greater support."

In this connection it might be well to note that Mr. Houlberg is President of the F.A.I. Model Committee which, of course, assures the next Wakefield competition of the utmost in international support, recognition and prestige.

The "Wakefield Type" event which will be included in the 1947 Nationals in Minneapolis on August 18-22 will provide an excellent opportunity for all Wakefield enthusiasts to trot out their latest ideas for Wakefield models and to give them a try under conditions of competition.

LAST CALL FOR PRE-WAR AMA NUMBERS—At the outset of hostilities, Academy Headquarters created a holding file for AMA license numbers in which were placed all those belonging to model builders known to be in the Service or at least inactive due to wartime activities. As may well be imagined, the Academy has been holding in reserve a large group of these numbers. Many have been reclaimed in the last two years by returning modelers, but the file is still rather large and the time has arrived for it to be cleared.

Therefore, all of you model builders who held licenses prior to the war and would like to have your old number reissued in your name, write immediately to AMA Headquarters and every effort will be made to reissue the same license number which brought you all that luck back in the old days. This is the last call!

IN WHAT CLASS IS A CO_2 ENGINE? Many requests have been received regarding the status of CO_2 power. Many modelers have suggested that a class for this type of engine should be created and that CO_2 engines should be flown in that class only. Others are more inclined to fly these new engines in competition with conventional rubber jobs and "see what happens." To our knowledge several Contest Directors have, at the request of model builders in their area, included CO_2 events in some of the contests. It is too early to make any intelligent decisions as a result of actual experience, but the Contest Board members are keeping an interested eye on all developments and it is expected that CO_2 engines will be discussed at the next Contest Board meeting.

According to existing rules, the CO_2 does actually fall within the same classification as rubber power. In other words, the existing rules differentiate between model aircraft powered by internal combustion engines and those powered by other than internal combustion engines. Naturally, model builders have considered in the past that "other than internal combustion" classification included for all practical purposes only rubber power. In any event, it will be very interesting to watch these developments and discover just how CO_2 will work out in competition with rubber powered models.

AMA Sanctioned Meets—The following list of sanctioned meets includes date location, AMA class, meet name, and name and address of the contest director. All inquiries, entrants, etc., should be sent directly to the latter.

July 12, Los Angeles, Calif. L.A.A.M. Record Trials. Ray O. Acord, 5111 Lemon Grove Ave.

July 12-13, Cedar Rapids, Iowa, STATE CON-

Some members of *Anderson (Ind.) Johnnies.* (Back row l. to r.) Bob Johnson, Fawn Swaney, Bob Williamson. (Sitting): Basil Porter, Glenna Williamson, Bill Lawson. Porter, club president, holds the "Dumbbell Trophy" awarded him for stepping on the tail of his own plane

Model Aeronautics

TEST. 2nd Annual John Pavlis Memorial Model Airplane Meet. Leo L. Miner, 428 1st Street, S.W.

July 12-13, Portsmouth, Va., STATE CONTEST. State Nationals Eliminations. L. R. Purdy, 744 Park Ave. Date is being changed. New date will be announced as soon as final decision is made.

July 12-13, Cadillac, Mich.—Pending.

July 12-13, Colorado Springs, Colo. STATE CONTEST. Colorado State Qualification Meet. Michael C. Markovich, 24 E. Colorado Ave.

July 13, Dayton, Ohio.—Pending.

July 13, Kansas City, Mo., Class AAA, Skykings Third Annual Contest. Tom Wardlaw, R. R. 4, North Kansas City.

July 13, Indianapolis, Ind.—Pending.

July 13, Salt Lake City, Utah, Class AA, UTE Aeromodelers U Control Meet. Jack H. Douglas, 133 East 2nd South.

July 13, New Kingston, Penna. Class AAA, 2nd Annual Pennsylvania State Championship Model Airplane Contest. Dr. J. Clarence Bachman, 2121 Derry St., Harrisburg, Penna.

July 13, White Plains, N.Y. Record Trials & Elimination, East Coast. Thomas A. Herbert, 257-59 Mamaroneck Ave.

July 19-20, Omaha, Nebr., STATE CONTEST. Omaha Post No. 1 American Legion Model Plane Meet. Oscar L. Olson, Jr., 2122 W. 56th St.

July 20, Dowagiac, Mich. Class AA Annual Exchange Club Meet. L. L. MacKenzie, 404 Walnut St.

July 20, Aurora, Ill. Class AA, Aurora Aeronuts Model Meet. Hart G. Betts, 7 Fox Promenade.

July 20, Creedmore, L.I., N.Y. Class AAA, Eighth Annual Northeastern Championships. William H. Fletcher, 8708 Grand Ave., Elmhurst, N.Y.

July 20, Kansas City, Mo. Class AAA, Model Aircraft Institute Meet. H. M. Schreiber, 3507 Prospect Ave.

July 20, Washington, D.C.—Pending.

July 20, Los Angeles, Calif. Class AA, Los Angeles Annual Glider Meet. Ray O. Acord, 5111 Lemon Grove Ave.

July 20, White Plains, N.Y. Record Trials & Elimination, East Coast. Thomas A. Herbert, 257-59 Mamaroneck Ave.

July 25-26, Louisville, Ky. Class AAA, The Courier-Journal, Louisville Times & Radio Station WHAS U-Control Model Airplane Trophy Meet. Robert McGee, 414 Fairlawn Rd.

July 26-August 2, Raleigh, N.C., STATE CONTEST—Second Annual North Carolina Model Plane Meet—Control only. Ralph J. Andrews, 408 Park Ave.

July 26-27, Hampton, Va. Class AAA, Brain Busters 5th Annual Championship. Charles Folk, 315 Cottonwood Ave.

July 26-27, Knoxville, Tenn. Class AAA, First Annual KMAC Meet. Hugh D. Powers, Briarcliff Road, Fountain City, Tenn.

July 26-27, Sedalia, Mo. STATE CONTEST, State Model Airplane Contest. J. E. Merrick, 111 E. Broadway.

July 27, Lansing, Mich. Class AA, Lansing Exchange Club Meet. L. Cecil Winters, 1310 Knollwood Ave.

July 27, Elgin, Ill. Class AA, Fox Valley Open Model Airplane Contest. R. W. Muchow, 102 N. Spring St.

July 27, Salt Lake City, Utah. Class AA, UTE Aeromodelers Free Flight Contest. Jack H. Douglas, 133 E. 2nd South.

July 27, Greenwood, Miss., Cotton States Record Trials. E. T. Jack Moralez, 320 W. Adams St.

July 26-27, Union, N.J. Record Trials & Elimination, East Coast. Thomas A. Herbert, 257-59 Mamaroneck Ave.

July 27, Worcester, Mass.—Pending.

August 3, St. Louis, Mo. Class AA, St. Louis Modelers Control Line Meet. Al Yount, 9405 Upland Drive.

August 3, West Chester, Penna. Class AA, Second Annual Meet. Howard J. Aldworth, 102 West Market St.

August 3, New Hyde Park, N.Y.—Pending.

August 10, Kansas City, Mo. Class AA, Model Aircraft Institute Meet. H. M. Screiber, 3507 Prospect Ave.

August 17, Lansing, Mich. Class AA, Lansing's 1st Gasless Meet.—L. Cecil Winters, 1310 Knollwood Ave.

August 17, Baltimore, Md. Class AA, Aero-Craftsmen Invitation Meet. Laurence Simms, 3410 Lyndale Ave.

August 3, Salem, Oreg. Class AA Cherry City Championships. Elmer J. Roth, 21st & Market St.

August 13, 14, 15, 16, Detroit, Mich. Class AAAA, First International Model Meet. Merrill C. Hamburg, 467 W. Hancock.

August 18-22, Minneapolis, Monticello, Minn. Class AAAA, American Legion 40 & 8 1947 National Model Airplane Championships, Paul J. Ring, 4150 29th Ave. So., Mpls.

August 24, Long Island, N.Y., Class AA, Eastern Championships. Peter Tryborn, 2734 Snyder Ave., Brooklyn 26.

August 31, Los Angeles, Cal. L.A.A.M. Record Trials. Ray O. Acord, 5111 Lemon Grove Ave.

August 31, Worcester, Mass.—Pending.

August 31-Sept. 1, Waterloo, Iowa. Class AA, 1947 Waterloo Prop-Twisters Club Meet. Gale M. Fenstermaker, 1419 E. 4th St.

August 31-Sept. 1, Kansas City, Mo. Class AAA, Model Aircraft Institute Tenth Annual Contest. H. M. Schreiber, 3507 Prospect Ave.

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8"	3½, 6, 8 Pitch	10 Pitch	
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11"	4 Pitch	6, 8 Pitch	10, 12 Pitch
12"		5 Pitch	8 Pitch
13"			5½ Pitch
14"			6 Pitch

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World War I

(*Continued from page 23*)

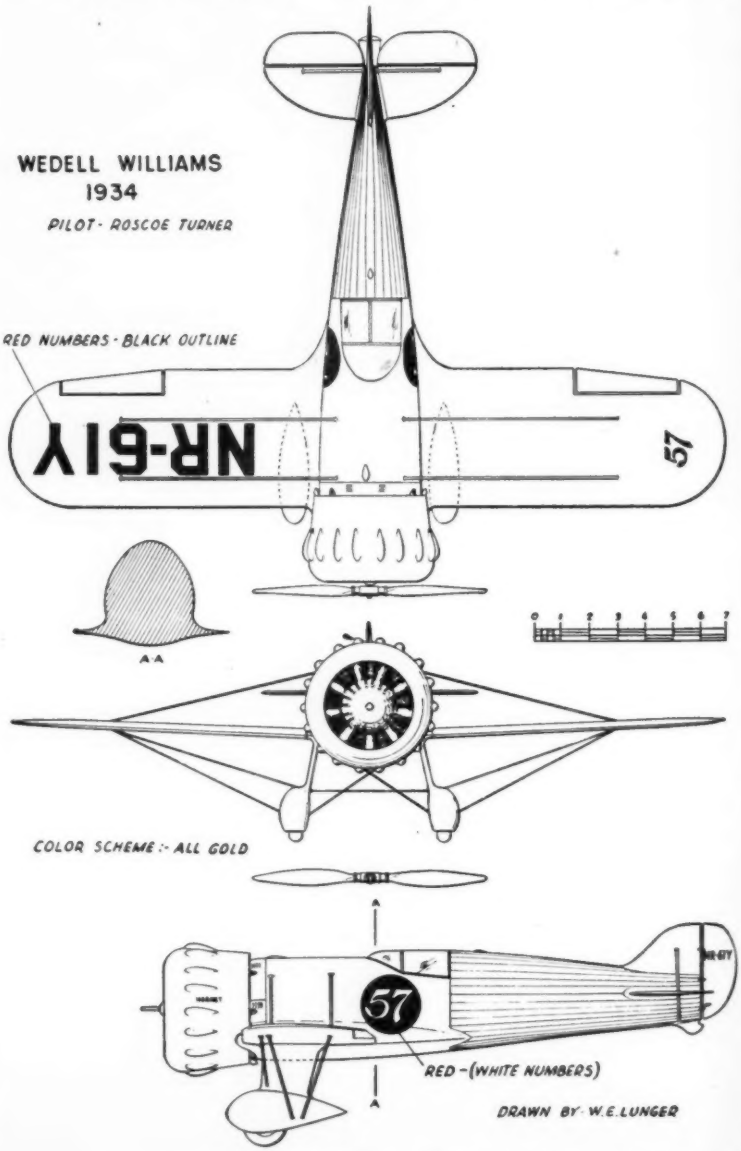
job effectively required a larger aircraft than had been designed for production up to that time.

Such reasoning on the part of the designer pretty well described the final product. It was big with its 100 ft. wingspan. 66 ft. overall length and 8000 lb. empty weight. Prototype engines were a pair of 275 hp Sunbeam *Maori* 12-cylinder V type motors originally designed and built for installation in a lighter-than-air craft. As a result of engine changes the bomber was developed through models 0/200, 0/300, and finally met its greatest success as the 0/400. Each of these models was identical in appearance and dimensionally insofar as the wings were concerned. 0/400 had shorter engine nacelles than the others—the only outward distinguishing feature. Overall length varied slightly because of minor interior structural changes from time to time. It is a tribute, however, that Handley Page's 1915 0/100 design should have been so good as to require no major changes throughout the war.

0/400 Construction

Size of the Handley Page 0/400 was its only startling feature other than its ability to operate at a power loading of 20 lbs. per hp and still possess a good useful range, military load and bomb load. Powerplants of the 0/400 were limited to the larger engines and again included the *Maori*, the Sunbeam *Cossack* of 350 hp, the Rolls Royce *Eagle* of 375 hp. and the 400 hp. Italian FIAT and American Liberty engines. It was the latter that powered many of the 0/400s used by the British Independent Air Force during its memorable raids on German industry during 1918.

Briefly speaking, the 0/400 was an overgrown conventional biplane. Its gross weight, Rolls Royce *Eagle* version, was 14,000 lbs. Empty weight was 8200 lbs., the



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OUT OF THIS WORLD

.59 HI-TORQUE MODEL ENGINE

Dear Fellow Model Builders:

Here is the new Fox .59 Hi-Torque. Look the picture over carefully. Note the long crankshaft, the off-set spark plug, the timer and carburetor locations, and the generally compact size. Visualize how this motor will fit in your new super model.

However, a picture cannot answer many important questions. Is it soundly engineered and precision built of quality materials? Is it dependable, durable and most of all how much power does it honestly deliver?

We have tested practically all of the popular engines. We know how keen our competition is and from our exhaustive tests we know that the Fox is as good as the best and better than most.

Over two years of research and development plus painstaking design, the use of the finest materials and precision manufacture by skilled men have produced an engine of long life and efficient performance that delivers a proven 7/10 HP at 10,000 RPM.

Inspect this motor at your dealers and plan to super-power your next model with a FOX .59.

Yours for better modeling

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ROTARY DISC INTAKE
PRECISION BALL BEARING
MOUNTED CRANKSHAFT

BORE	.937
STROKE	.860
DISPLACEMENT	.599
WEIGHT	9½ OZ.
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Two sizes, V-2 or V-3 . . Durable steel
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1/8" or 3/16" flat, 30 feet for 20¢. Min. order 150 ft.

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Plastic barrel . . metal ends . . takes two medium size dry cells . . 20¢ each

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For scale solids . . Dural wheel with Neoprene tire . . 20¢ pair

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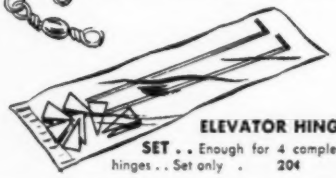
With backing washers . . Holds wheel securely on landing gear . . 2 collars and 2 washers . . 20¢

SNAPS AND SWIVELS
For U-Control lines . . Set of 2 snaps and swivels and 2 extra snaps, only 20¢



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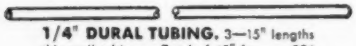

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disposable load 3500 lbs., fuel load (300 gal.) 2300 lbs. The 0/400 could cruise for 8½ hours at 80 mph, or approximately 650 miles. The bomb load was normally 2000 lbs., sometimes greater on short range flights. The Liberty engine version was slightly lighter—13,791 lbs. gross—but otherwise possessed almost identical weight and range characteristics.

The bomber's 62 ft. 6 in. long fuselage was made in three sections. The forward section contained a cockpit with side-by-side seating for the pilot and co-pilot, and in the extreme nose a pit for the forward gunner-bombardier. Standard nose armament consisted of two Scarff-mounted air-cooled Lewis machine guns. The middle section carried a 300 gal. fuel tank, fittings for the lower centersection and landing gear attachment, and clips for attaching the upper centersection struts. At its rear was a cockpit for the rear gunner whose Scarff-mounted Lewis guns were situated on top the fuselage. The rear gunner operated from a floor midway between the upper and lower longerons and was provided with high, narrow windows on each side of his emplacement. The remainder of the fuselage aft was a tail section in which no equipment was carried.

The entire fuselage was built up of wood longerons, uprights and crossbraces assembled with stamped steel fittings, pins, and braced with steel wire. The flatness of the fuselage top, sides and bottom was broken on the upper deck of the forward section by a stringer and former coaming around the cockpits.

The 0/400's biplane empennage consisted of a one-piece upper horizontal stabilizer, right and left lower horizontal stabilizers, right and left balanced rudders set between the stabilizers, and upper and lower balanced elevators. A single fixed vertical fin was located between the fuselage and the upper horizontal stabilizer. The entire empennage was strutted and wired like any conventional biplane, spanned approximately 20 ft. and was rigged at 1 deg. positive incidence. All members were framed of wood spars and ribs. A huge, single shoe tail skid was pivoted from a steel tube inverted tripod arrangement located on the bottom of the fuselage just ahead of the empennage.

Area of the 0/400's wings totaled 1630 sq. ft. Chord of both planes was 10 ft., upper span 100 ft., and lower span 70 ft. Incidence of both wings was 3 deg. positive, and dihedral 4 deg. Gap was 11 ft., overall height in flying position 22 ft., and height with wings folded 17 ft. 6 in. By equipping his huge bomber with folding wings, Handley Page eliminated the need for unusually large hangars for storage of large machines. Folded, the 0/400 wings were reduced in span to slightly less than 32 ft. In folded position the wings rested parallel to the fuselage with their tips over the empennage. Folding and unfolding was accomplished in a matter of minutes by the use of quick disconnect fittings.

Wings of the 0/400 were conventionally constructed of two spars to which the ribs were attached. Front and rear spars were of box design, left solid at fitting locations. Because of their size, ribs were stressed against compression forces by a system of girder-forming members rather than the usual plywood webs found in smaller aircraft of the period. Each of the wing panel frames was further strengthened by a series of spanwise stringers fitted between the rib caps. Huge balanced ailerons were fitted only in the upper wing, hinged directly to the rear spar.

Interplane bracing comprised two bays of streamlined solid wood struts and the usual landing and flying wires. The latter were all paired, multiple strand, steel cable. Overhang of the upper wings was braced on its upper surface by a kingpost and cable arrangement. Upper and lower main planes were attached to center section panels which, in turn, were attached to a system of centersection struts and to the lower longerons. The twin engines were mounted between the centersection panels at their outer ends by a system of steel tube bearers which distributed weight evenly between the two surfaces. Each

Snap To Start
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lower centersection panel, in addition, supported its own two-wheeled landing gear assembly. Each of the four wheels ran on an individual floating-type axle and was provided with its own shock absorbing system of rubber cords enclosed in a streamlined aluminum casing.

0/400 Performance

In spite of the maze of wires and struts which graced its exterior, performance of the Handley Page 0/400 was amazingly good for its day. Fully loaded, the Rolls Royce version had a top speed of 97 mph at sea level, 95 mph at 6500 ft., and 93 mph at 10,000 ft. Its landing speed at a gross weight of 10,000 lbs. was 50 mph. It climbed, fully loaded, to 5000 ft. in 10 minutes, and to 10,000 ft. in 25 min. Ceiling was between 10,000 and 15,000 ft. depending on flying weight. While it was neither stressed nor designed to engage in aerial acrobatics, instances are on record where 0/400s were spun and banked vertically without fatal results. The ships were stable in flight, required little attention on the part of the pilot, but were heavy on the controls. With one engine out their yaw was terrific and required a strong legged pilot to hold to the course. The 0/400 accelerated rapidly and on the takeoff left the ground after a 600 to 800 ft. run.

Operationally, the 0/400 was a big success once it got into action in numbers although its service was limited to a few picked squadrons, notably those of the Independent Air Force. Now long forgotten, this almost legendary group was organized under Gen. Hugh Trenchard, RAF, for the sole purpose of bombing the industrial centers of Germany. The IAF operated independently of any Army command and was the first example of applied use of aircraft in *strategic* bombing as contrasted to *tactical* bombing. In addition to its bombers, the IAF maintained its own pursuit and reconnaissance squadrons which reported to Trenchard. From May 1918 to the Armistice, IAF 0/400s conducted an unrelenting day and night attack on German industrial targets, the round trips averaging nearly 350 miles, and in all kinds of weather. Toward war's end, the 0/400s were carrying 1650 lb. bombs—the "block busters" of WWI.

It cannot be claimed that the 0/400 was a high production airplane as were some types, since only 122 were constructed in England. Each ship was a hand-made affair because so few were ordered at a time. Production tooling never was built. It was not until January 1918 that some semblance of quantity production was achieved, and then each airplane was scheduled at 118 days from raw materials to finished product. Adequate factory facilities was one problem: British lack of faith in big planes and dependence on short range single-engine bombers was another.

The 0/400 was selected among other foreign types for production in U.S.A. during 1919, procurement running to 107 units. The first example was built in this country by the Standard Aircraft Corp., Elizabeth, N.J. and made its maiden flight on July 1, 1918 after 125 to 150 men worked three 8-hour shifts for 90 days to complete it. This first American-built 0/400 was named the "Langley" in honor of that pioneer American flight scientist.

U.S. plans for the 0/400 were ambitious, calling for 10,000 units to be built during 1918. While this figure was entirely out of reason once various government boards investigated manpower and supply situations, it is nevertheless interesting to show how much faith finally was put into Page's brainchild. Designs were actually made for installation of ferrying tanks which would permit 0/400s to be flown to Europe via the Azores.

The real tribute to Frederick Handley Page and his bomber was the fact that the big 1915 bomber was far ahead of its time in principle. Had the British placed several squadrons at the Front in 1916-17, the war might have been shortened. As it was, the decisiveness of the 0/400 never will be known because whatever effective qualities it possessed were put to use too late for a real test.

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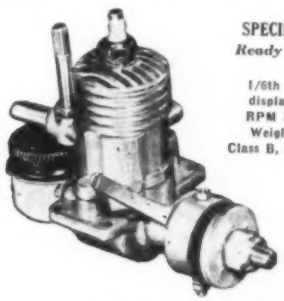

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Design Forum

(*Continued from page 13*)

because stability in full scale aircraft is largely dependent on operation of these surfaces by the pilot. Obviously, in a free flight model these surfaces must be fixed unless a radio control mechanism is used. To secure sufficient corrective moment with fixed surfaces, these surfaces must be increased in size so that any small angular deviation from normal flight position will generate corrective moments large enough to bring the airplane back to normal flight position before stalling takes place. This is the basic reason for enlarging the tail surfaces of free flight scale models. True scale models have been flown but they are usually critical. So, if you are testing a particular design of full scale aircraft in model form, it is necessary to increase the area of stabilizer and fin at least 50% and often 100% in order to obtain the required stability in flight. Only when an airplane is stable can its flight characteristics be interpreted. Obviously such changes are imperative in free flight testing.

Some years ago, before any full scale pilotless aircraft were heard of, the author was requested to develop such a craft. Full scale practice obviously had to be abandoned because of certain critical conditions present in all existing full scale aircraft at the time. The natural approach was to build model prototypes for study; creations of one or more of these would be comparatively inexpensive, whereas a crash of the full scale ship might prohibit further testing. So, a 4 ft. model of the plane was designed and built. This was laid out carefully according to the rolling axes to obtain the desired behavior in flight. The model was tested in a 30 mile wind. It took off, turned downwind and gradually rose to considerable altitude. The flight speed was close to 60 mph. Finally the motor cut without causing any perceptible change in flight attitude except that it gradually assumed a gentle gliding angle, landing safely into the wind "three point." This model flew directly off the drawing board, and its behavior was exactly as predicted by theoretical design.

There was only one thing lacking. We were unable to study its behavior in response to operation of controls when in flight. The next step therefore was to control this by radio. Before this could be done, however, the whole project was discontinued. Nevertheless it served to show the usefulness of models for test flying and to determine characteristics of full scale designs. This is an interesting approach to the problem, but up to the present has not been popular because of the many difficulties involved. However, the comparatively recent development of U-control provides a solution. This pleasing pastime can now be applied to a more useful purpose than merely measuring laps of a plane flying at the end of a string. *It supplies the control means for prototype models in flight.* Characteristics of these models can now be determined by manipulating controls as well as when controls are fixed. Consequently, a whole new unexplored and extremely scientific field of aeronautics is now opened up.

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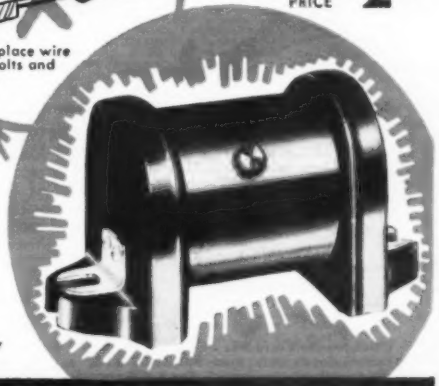

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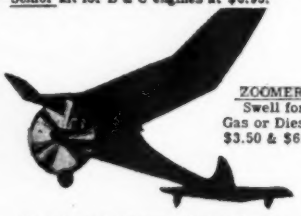

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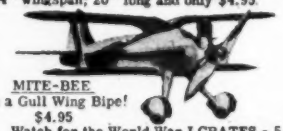

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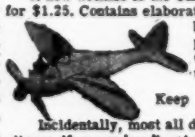

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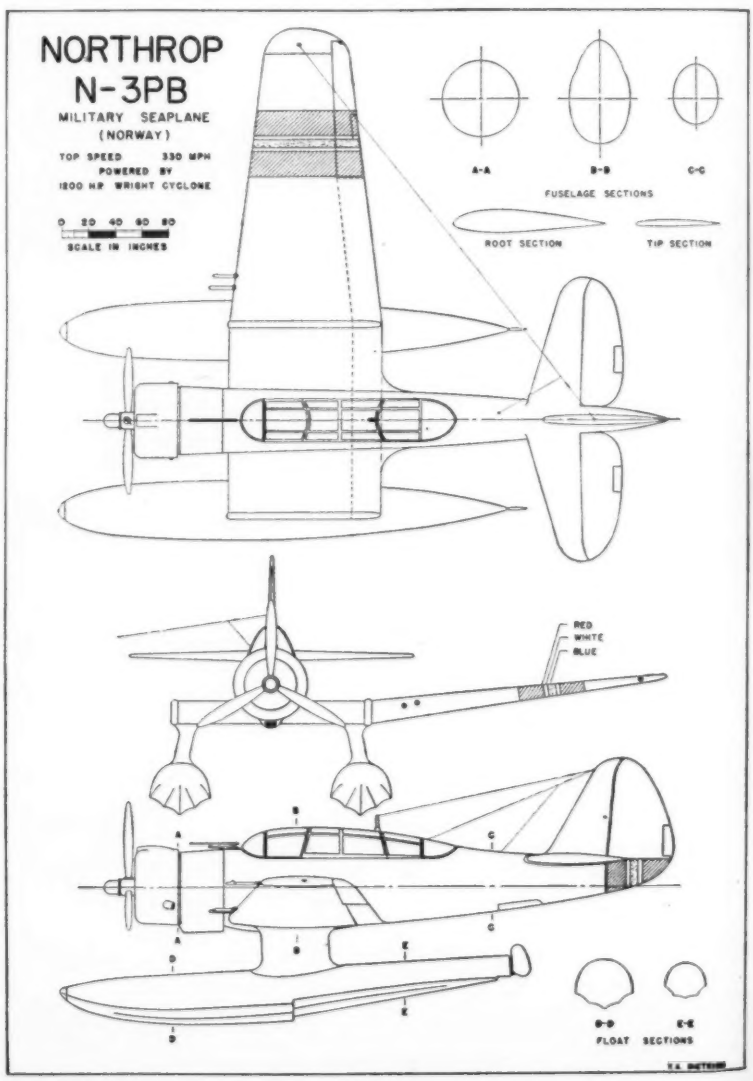
wing or any other part of the plane except at the control arm close to C.G. This allows the plane to react freely and without restraint. If the wings are attached to wires the normal action of dihedral and the directional effect of the fin are eliminated and therefore cannot be observed. U-controlled, with extra long lines if desired, the model can be flown and the control surfaces operated when it is in flight just like a full scale aircraft. Its general flying characteristics can be observed first with controls fixed and without moving them. Once they are set for proper flight trim, stability and recovery characteristics of the airplane can be observed with these fixed surfaces just like a free flight model. Then reactions may be observed when the controls are operated in any particular manner. Tests can be made for effect of elevators, rudder and even ailerons, if desired, by adding a third control wire. Where space is available control lines as long as 150 ft. may be used. This is of particular advantage when testing models of 4 ft. span or more.

If you intend to build an exact scale model of a full scale airplane you should proceed as follows: For U-control, scale down all measurements exactly without modification. The first step is to determine the size of the model. As an example of the method to use, let us say the model is to be 1/10 the scale of the full size plane. Suppose the span of the large ship is 36 ft. Span of the model then will be 3.6 ft. The area of the large plane is approximately 175 sq. ft.; of the model 1.75 sq. ft.; that is just 1/100 the area of the large plane—where area is involved the scale reduction is 1/10 squared.

Now you come to the important point: in order that the reactions of the model in flight be similar to the full scale aircraft, the speed as well as the size must be scaled down proportionately. If the speed of the large plane is 100 mph the speed of the model should be 10 mph. With this reduction the time required to travel a distance equal to the span of the planes is the same in both large plane and model. Of course this means that the weight reduction follows a certain ratio also. If the large airplane weighs 1750 lbs., weight of the model reduced in proportion to its area would be 17.5 lbs.

(*Turn to page* 46)



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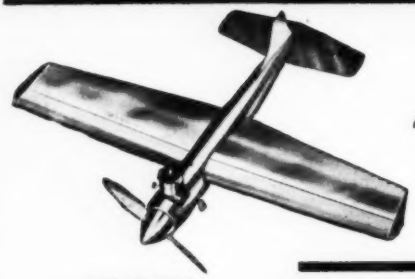

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However, a model of this weight would have to fly at the same speed as the full scale plane in order to support this load. The model speed is to be 1/10 of the large plane's speed, however, and as weight is proportional to the square of the speed, total weight of the model will have to be 1/100 of 17.5 lbs. or .175 lbs., which is 2.8 ozs.

This is rather light and such a plane with a wingspan of about 42" would have to be of the rubber type. With this type of power, however, the inertias of the model are not equivalent to the inertias in the full scale plane because of the distributed weight of the rubber motor. To produce a rubber model with equivalent inertias the rubber motor would have to be concentrated over a length of only 3" to 4". This can be done if multiple motors and gears are used to form a single motor unit. However, it is much more advisable to increase the scale of the model.

For instance, instead of reducing the size of the full scale ship 1/10, build the model to a 1/6 scale. This gives a 6 ft. wingspan and a wing loading equal to the loading of the average present day gas models, namely about 9 ozs. per sq. ft. The speed of the gas model then would be about 20 mph., making the speed of the large plane 120 mph, which is logical for this type. Such a model flown with control lines should react in a similar manner, in all phases of flight, as the large ship. Reactions of course will be less intense because the inertias are much smaller, but they will be proportionally the same as in the big ship.

Some builders may wish to fly their model free flight or possibly control it by radio. In either case, no control lines will be attached to the model so that the model will have to do its own job of flying and recovering from any displacements. In other words, it will have to be as stable with its fixed control surfaces as the full scale plane with stability generated by movement of the controls. To create this added stabilizing effect when the surfaces are fixed, area of the surfaces must be increased so the corrective force generated by the enlarged fixed surface is equivalent to the force generated by the smaller but movable surface of the pilot controlled aircraft. To do this the stabilizer should be increased 100%. Usually the stabilizer area of a large plane is about 15% of the wing area, so the stabilizer area of the model should be 30% of the wing area. Fin area of the model should be about 7% of the wing area. The wing dihedral should be approximately 9°. This is obtained by raising each wingtip above the high camber point at the center a distance equal to 1" for every foot of wingspan. If the span is 6 ft. each wingtip should be raised 6" above the wing center point. Models can be made to fly well with less, but this amount of dihedral is advised in order to provide the excess stability usually required for hazardous flying conditions that sometimes occur. Not only this, but with larger dihedral there can be a larger variation of error in the fin area than can be tolerated if the dihedral is small. With less dihedral the fin area must be reduced in order to prevent nosing in tendencies. With smaller fins, models do not nose in as quickly and therefore in banks recover before the spiral dive has a tendency to start. This is not the only factor that controls spiral diving, but in some ships there are natural spiral diving tendencies which large fins aggravate and increase. In such a ship the only cure is

to reduce the fin size. In so doing, however, you cure the spiral diving tendency but create the tendency to spin because of reduced fin area; sort of "out of the frying pan into the fire." With sufficient dihedral both these difficulties can be reduced even though spiral diving may not be eliminated. The only sure way of eliminating spiral diving is to lower the center of lateral area which reduces banking tendencies and therefore the tendency of the nose to drop into a tight spiral as well.

The actual power required to fly the model is reduced in proportion to its size; that is, the power loading of the model should be about the same as the large ship. For the 6 ft. model it will require about 1/12 hp. This means, however, that a motor of nearly double that power, or 1/6 hp., will have to be installed in order that the power delivered will be proportional to the full scale plane. This is largely due to the drop in propeller efficiency in the model. This loss of efficiency results chiefly from the high rotating speed and comparatively small blade angles used on the average model prop. Compared to full scale propellers its efficiency is as low as 50%. Incidentally, if you wish to increase the propeller efficiency of your model, equip your engine with a reduction gear so that if your engine turns 10,000 your propeller will turn only 2000. In this way a larger prop will be required, but it will deliver nearly twice the effective power.

To provide an interesting yet practical problem for control testing, we show Fig. 1 which is a U-control version of the Army *Mixmaster* designed by Joe V. Molesky of Detroit, Mich. He is building one for himself at present and tells us he will give us the results when he has tested it. Any U-control fan who has become slightly bored with the problem of speed alone can build this little ship and not only obtain high speed but he will become familiar with the problems developing from placing the propeller in the tail of the ship. Here U-control testing will show not only the aerodynamic characteristics of such a plane, but many advantages or disadvantages from a structural standpoint will come to light while actually building such a model. Heretofore in Design Forum we could only theorize concerning aerodynamic and structural value. Now, by U-control, every Design Forum reader with a new brainchild can build it as a U-control model and determine not only the structural feasibility but the aerodynamic characteristics of his plane.

Molesky's plane should prove not only very fast but quite stable. The effect of directional control can be studied by fixing either top or lower rudder while operating the other during flight. Such an experiment will show the effect of placing the rudder high or low. The effects of other design features, such as a V-tail for instance, can also be worked out. One of the chief advantages of this method of testing lies in the possibility of testing radical planes with comparatively little damage. Sometimes model builders hesitate to fly planes of untried design because of the probability of a crackup and many hours of work wasted. When flying by U-control any inherent fault which may develop in the stability of the craft can be overcome, in most cases at least, by operating the controls so that the craft is brought to earth safely again in order to make changes.

A plane of this radical type which one might hesitate to fly free flight is shown

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in Fig. 2 submitted by Don Osborne, Syosset, N. Y. Osborne's plane is basically a tailless model with small forward wings incorporated to form a canard design. It is very unusual but should fly well as a U-control model as well as a full scale airplane. If the angle of attack of the rear wingtips is slightly less than the angle of the center portion of the wing, the rear wing in itself will provide considerable stability. With the stabilizing effect produced by setting the forward wing at a more positive angle of attack than the main wing, the plane should be very steady.

There is only one apparent fault in its design. The center of lateral area is too close to the C.G. if not in front of it, and the C.G. is too far back. In other words, the vertical fin area at the rear is not large enough. This plane might have a tendency to "crab," the tail swinging one way and then the other. The lateral area is also slightly too high, caused by the high fins at the wingtips. If these fins are dropped and attached to the tips at their center, the area distribution will be much better. The vertical fin extending down from the fuselage below the wing should be farther to the rear. A suggested side view of this ship is shown in Fig. 3. Grant wing slots are shown in Mr. Osborne's design. In this particular case they are unnecessary because sufficient stability is present without them. However, they may be used for added stability. The action of these slots is to increase the lift over the wing trailing edge at high angles of attack, thereby causing the center of pressure on the wing to move rearward and to stabilize the airplane by causing more lift at the rear so the nose will drop.

We invite readers to send in U-control test versions of their dream ships, and if they have actually flight tested any of them we suggest that they pass on the results to their fellow readers through the columns of Design Forum.

Model Airplane Newsletter

(Continued from page 6)

fessional'—I'd be ashamed if I were you."

That sounds like a very honest report to us. Evidentally Don has found that entering the model business has made him an "amateur" professional, whereas prior to the establishment of his concern he might have been considered a "professional" amateur.

This subject is not confined to New York and St. Louis alone. Clubs all over the country are discussing the professional aspect of aeromodeling and wondering if anything can be done, should be done, or ever could be done about it.

While in Washington, D.C. recently visiting AMA headquarters we got into the subject of the professional entrant with A.M.A.

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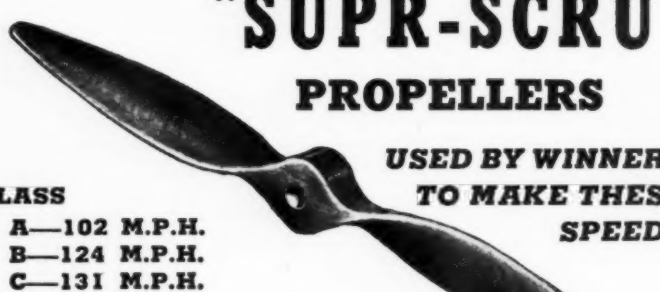

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President Everett N. Angus of Oaklyn, N.J. Frank Nekimken, assistant chief of American Legion's special activities section and contest director for the 1940-41 National Meets in Chicago, and Bill Tyler of N.Y.C., noted indoor flyer. This trio agreed that it was well nigh impossible to define professionalism in the model contests. Mr. Nekimken pointed out that the subject had been discussed at the annual AMA leaders' meeting in Wichita last year and at the end of 3 hours those attending were able to agree on but one point: that they were in complete disagreement on what constitutes a "professional."

Outcome of the Washington pow-wow was that Messrs. Angus, Nekimken and Tyler came to the conclusion that the entire matter would resolve itself without difficulty if the "professional" model contest winner would do just one thing: Turn his prize over to the next highest man in the winners' column who was not employed in the model industry.

In this manner, Joe Doakes of the Doakes Model Airplane & Supply Co., enters a meet and flies his latest design which will soon be available in kit form. All entrants in the competition do their darndest to beat Joe and have a big time flying against him. Well, Joe has a good ship and he wins first place. He's very happy—his model receives a lot of publicity, his picture appears in the local paper, and lots of modelers want to know when they can get kits of his superspeedster. And—best of all—Joe is considered a great guy, a true blue sport because he took his first place trophy and motor and turned the trophy over to the second place winner who was not employed in the industry and the motor over to the 4th place contestant, also an amateur. He skipped over the third place winner since that chap worked in a hobby shop.

Does that all sound far fetched? Maybe you think it wouldn't work out. Then let us tell you about a chap who is already following that plan—

Fellows, meet Leon Shulman. Leon is an ex-Air Force pilot and designer of many famous free flight and control line models which have been produced by various companies in kit form. Leon is a "professional," but he is just as enthusiastic a meet entrant as the most "amateur" amateur. Not long ago he competed in a Toms River, N.J. meet and took a number of prizes with his new diesel engine. A week or so later he repeated his performance at Atlantic City. Did he step up and take all that hardware, merchandise and prize material? He took the prizes, but he immediately turned them over to the next contestants in line who were not professionals. Of all the main prizes, he retained only one engine, and that simply because he wanted to conduct

tests on it for his club, the *Linden Model Airplane Club.*

What Mr. Shulman is doing—others can do. Here is a wonderful opportunity for the Model Industry Assoc. to step in and conduct an "educational campaign" among all its members to spread the idea around—industryites should fly for the glory and publicity, but should pass along any of the permanent hardware to the amateur next in line in the contest winners listing.

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Plane on the Cover

(*Continued from page* 19)

and bring him down safely with a minimum of ground space and difficulty in operation, but with maximum economy and safety. A few weeks later the preliminary designs were completed and the astonishing Lockheed *Little Dipper* was born.

When his fellow engineers were allowed to peek, they saw a tiny 25 ft. span single place plane that was simplicity itself. Powered with a two-cylinder engine developing 50-60 hp, the little craft had a tricycle landing gear and a snug bubble canopy for its single occupant. Spinproof and stallproof, the *Little Dipper* design was completed hurriedly and a prototype built in great secrecy. So secret was its first test flight that only Thorp and a small group of Lockheed designers witnessed it. But they quickly knew they had something! When all necessary minor adjustments had been made, test flights continued, and the tiny craft was sent on its way to Washington.

There a small group, including Gen. Henry H. "Hap" Arnold, then Commanding General of the globe-girdling AAF, stood on the Pentagon lawn and watched a tiny airplane circle down out of space and drop to a breathtaking landing on the turf. The takeoff test left those watching the performance literally breathless as the little ship seemingly leaped from the tarmac and soared into the air.

Then fate stepped into the *Little Dipper* history with V-J Day putting an end to AAF procurement, and not many weeks later the astonishing little aircraft was demolished at the Lockheed plant when it failed to clear an obstacle. With reconversion problems, personnel cuts and the P-80 *Shooting Star* occupying their major attention, Lockheed executives shelved the Little Dipper. But John Thorp didn't!

He resigned from Lockheed with little waiting for him in the future but an abiding faith in the ideas he had given to the *Little Dipper*. By enlarging the design to accommodate a pilot and passenger, Thorp believed the resulting airplane would provide at least one answer to the lightplane sales problem: outstanding engineering for technical appeal, low price for pocketbook appeal.

One of the first steps in the design of the new plane was the selection of a "forgotten" airfoil, the NACA 4412, a code indicating a maximum camber of 4% of the chord located 4/10 of the chord back from the leading edge and with a maximum thickness of 12% of the chord. This airfoil has an exceptionally high maximum lift coefficient (modelers please note!) with a satisfactorily low drag coefficient. As a matter of fact, the ratio of the maximum lift coefficient to minimum drag coefficient is 179, which is well along towards the goal of 200 aimed at by John K. Northrop for future flying wing development. The pitching moment of the 4412 indicates a high degree of stability as the wing angle of attack is changed, with the maximum forward point lying at 31% of the chord. The maximum lift drag ratio is attained at an attack angle of about 1½°, and the airfoil does not stall until an angle of 22° is reached. But Thorp has seen to it that the *Sky Skooter* never reaches that angle! By insuring against stalling he also insures against spinning, and thereby achieves a "foolproof" airplane.

Thorp uses an "all moving" horizontal tail which consists of eliminating the horizontal stabilizer and mounting the

(*Turn to page* 54)

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entire assembly in such a manner as to permit movement of the whole surface by the control stick. For example, as the stick is pulled back, instead of just an elevator moving up while the stabilizer remains fixed as in the conventional plane, the *Skooter* surface moves down in front and up in back. This all-moving tail, of course, might require constant work on the part of the pilot to keep it trimmed into the slipstream. Thorp solves this problem by attaching a large trimming flap on the trailing edge similar to the system used by Dr. Hugo Junkers in his giant aircraft during the peaceful 'thirties. Thorp foresees an expanding future for this system and recent NACA research on both all-moving vertical and horizontal tail surfaces appears to bear out his contention. As a further safety precaution, Thorp uses "push-pull" tubes for the control system, eliminating the cables previously used.

The *Sky Skooter* has preserved the economical trim size of the *Little Dipper*, and Thorp has built in two place side-by-side seating without increasing the 25 ft. span of the original single place version. Throughout the design, Thorp's guiding principle has been simplicity. By eliminating curves, he has eliminated much complex tooling and permitted "wrap-around" skin construction. The wing structure eliminates numerous ribs and stiffeners by the use of corrugated skin which, in the plane of the airflow, presents little additional drag in comparison to the weight it replaces. By such simplicity of construction Thorp has created a two place personal airplane that weighs only 565 lbs. empty! And this, believe it or not, is about 20% less than that of a *Cub* and achieved in an all-metal design!

Thorp's original plan was to use a two-cylinder engine of the same 50-60 hp rating as the original *Little Dipper*, but this has been increased to a four-cylinder Lycoming 0-145 developing 75 hp. at 3100 rpm on 73 octane fuel, which is about the same as a good grade of automobile gasoline. Not content, however, with doing an outstanding aerodynamic job on the *Skooter*, Thorp went to work on the engine and came up with a radically new venturi engine silencer that cut engine exhaust noise a flat 50%! At cruising speed of 2550 rpm, the *Sky Skooter* propeller makes only moderate noise, resulting in one of the quietest airplanes now on the market, a real achievement at a time when the objection to noise is balking the construction of airparks throughout the nation.

The astonishing performance of the *Little Dipper* has been built right into the *Sky Skooter*, for the craft lands with a roll of 200 ft. and gets off the ground after a run of only 300 ft.; that, surely, is a mark to shoot at! Once in the air the two-placer climbs 600 ft. per minute, another factor 20% better than the famed *Cub*.

The *Sky Skooter* has a top speed of 115 mph and cruises at 100 mph, the exact mark at which Thorp was shooting. It lands at only 45 mph, which should be safe enough for any pilot with the rugged tricycle landing gear used.

Thorp has moved out of his Burbank shop and taken quarters at 8000 Woodley Ave., Van Nuys, Calif., which is about 10 miles across San Fernando Valley, affording him flight testing space for his planes as they roll off the line.

Thorp readily admits he is in no hurry to rush the *Skooter* into production, a hazy dream that has destroyed many blossoming lightplane designs. He spent nearly a year flight testing his new prize

and made numerous changes designed to insure greater safety and reliability. A major feature of this development program was the progressive design of large wing root fairings to prevent premature stalling of the roots and to produce a noticeable buffeting of the tail accurately at the plane's stalling speed.

The real news about the *Sky Skooter* is that it has just passed its CAA type certification and now stands approved for production and sale. Next and final step is the production of the airplane in quantity, and Thorp is readying his creation for that process. By careful attention to simplicity of design, the *Skooter* promises to require a minimum of tooling, and construction can largely be accomplished by applying aluminum sheet and corrugated sections directly to the structure ready for riveting.

Having produced an advanced engineering design of simple construction for inexpensive manufacture, Thorp has satisfied the first of the approach requirements for successful lightplane sales. Next step is quantity production bringing the price down further. Thorp believes he can sell his trim *Sky Skooter* at the pleasing price of $1800 if he can book orders calling for production of 18 per day. After this has been achieved, he will be gunning for that mythical $1000 price tag that so many of us have been waiting for.

It isn't easy for a young engineer to turn his back on the good pay and security of a design job in a large aircraft factory and strike out on his own in one of the most competitive fields in modern industry. John Thorp has done it, and in the next few months we will be able to judge how well. But if wise design, forward-looking engineering, production simplicity, safety and economy are the requirements for success in the personal aircraft manufacturing field, then Piper and Luscombe had better look to their laurels, for Thorp's *Sky Skooter* fills that bill to a "T"!

Flash

(*Continued from page 2*)

fighters and bombers will require the firm's whole attention and manufacturing facilities for several years. Perhaps by that time, company spokesmen state, the personal aircraft picture will have cleared, one way or the other!

THE MOST POWERFUL fighter in the entire world has been announced by the Navy—the McDonnell XF2D-1 *Banshee*, a scaled-up version of the well known FD-1 *Phantom*. The new craft is powered by two Westinghouse 24-C axial flow turbojet engines of more than 4000 lbs. thrust each. In addition to a speed of over 600 mph (well in the record-breaking class), the *Banshee* has a rate-of-climb of 9000 ft. per minute! A major feature of the new larger fighter is its long range, achieved by use of five large self-sealing fuel tanks. Long range is achieved through use of one engine, thereby cutting fuel consumption in half and still maintaining tremendously high speed by modern reciprocating engine fighter standards. Pending extensive flight and service tests on the *Banshee* at Naval Air Station Patuxent and on the new large carriers at sea, McDonnell is at work on a Navy contract for 30 FD-1 *Phantom* jet fighters at a cost of $6,915,826. The new *Phantom* features square empennage assemblies.

THE NAVY REVEALED that far from being dead, the flyingboat is still very much in the picture. Engineering work is now well underway on the Consolidated Vultee XP5Y-1, a jet propelled flyingboat in the 150,000 lb. class. The mockup has been com-

(*Turn to page 57*)

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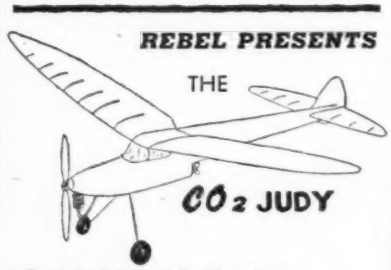

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pleted and construction will start shortly. The new jet flyingboat incorporates a radically new type hull designed by NACA. Known as a "planing tail hull," the design eliminates the second step and carries the familiar "V" bottom all the way to the tail. Purpose of the design is to eliminate water drag during takeoff and airdrag in flight. By making the extreme tail end of the fuselage work, a small surface on a long moment arm is made to do the work of a much larger surface on a much smaller arm, as in conventional "two-step" design. The new hull will be tested shortly on a Grumman amphibian, which is being modified for the purpose by Edo Aircraft Corp.

CONFIRMING AN exclusive item in these columns two months ago, Grumman Aircraft will install Rolls-Royce *Nene* turbojet engines in the new F9F fighters. The engines will be built in this country by Pratt & Whitney Division of United Aircraft. Rights to the manufacture of the engine have been purchased from the Taylor Turbine firm, which secured rights to Rolls-Royce engines a year ago.

IT IS OLD stuff to modelers but of considerable interest when an aircraft manufacturer makes major changes in the aerodynamic layout of a large airplane. Glenn L. Martin has added dihedral to the famed Model 202 to provide additional stability, following the request of various airline pilots who have flown the first experimental models. In addition to the increased lateral stability thus provided, Martin is adding a large dorsal fin for added directional stability. Other changes include spring-tab elevator control system, modified flap extension gearing and changes in the patented Van Zelm ailerons. Twenty 202's have been completed and deliveries will start following CAA certifications tests, now underway.

WATCH FOR A quick conversion of the lightplane industry from two-place to four-place production. The past two years witnessed first the anticipated deluge of orders for two-place designs, then last winter the peak of the sales curve, and this spring and summer the last of the seller's market. The four-place market is wide open for a design selling for anything less than the $6-7000 tag on the *Navion*, *Seabee* and *Cruisair*. Cessna has announced its new Model 190 and 195, a slightly enlarged version of the popular 2-place design. The new design is one of the best looking planes in the current crop. Fairchild is readying its four-place Model 47 for early 1948 production. The new four-place *Ercoupe*, instead of the twin-engine design previously projected, will resemble the standard side-by-side version with tricycle gear and twin tails. The two-control feature will be retained, of course, but it will have special flaps designed by Fred Weick following extensive aerodynamic and flight tests of a dozen different designs.

THE NOISELESS AIRPLANE is here, at long last. NACA recently demonstrated a completely noiseless airplane at its Langley Memorial Aeronautical Laboratory before 200 engineers and executives of the industry. The airplane was a specially modified AAF Stinson L-5 *Sentinel* equipped with a five-blade, fan-type propeller. The noise was reduced 90% by actual analysis and the plane was almost inaudible flying overhead at a height of 300 ft. Since shock waves at the speed of sound are the major source of propeller noise, keeping the tip speed below sound is the solution. However, the slower turning prop requires more blade area and more blades to provide the thrust required for equivalent performance. Several lightplane propeller manufacturers, notably Sensenich and Aeromatic, are readying fan-type propellers for production installation. This, the major objection to airpark expansion, may well signal the "Go ahead" on airpark construction and consequent great increase in lightplane usage.

HOWARD HUGHES, unpredictable, but one of aviation's real pioneers, has completed development work on his airborne radar unit which weighs only 16 lbs. and will sell for $135. The device, a terrain clearance indicator, consists of radar pulses which project forward of the airplane and warn the pilot of an obstacle 2000 ft. ahead. For ground clearance the unit indicates a

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Super Sinbad	2.50	Thermic 70	3.50
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Meow Z-3	0.50	Albatross	4.00

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1/16x1/4	2c	1/16x2	8c
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1/16x1/2	3c	1/8x2	10c
3/32 sq. 3 for	4c	5/32x2	12c
3/32x3/16	2c	3/16x2	14c
3/32x1/4	2½c	1/4x2	16c
3/32x3/8	3c	5/16x2	18c
3/32x1/2	3½c	3/8x2	20c
1/8 sq. or	3c	1/2x2	22c
1/8x1/4	2½c	1/32x3	10c
1/8x3/8	3½c	1/16x3	12c
1/8x1/2	4c	3/32x3	15c
5/32 sq.	1½c	1/8x3	19c
3/16 sq.	2c	3/16x3	22c
3/16x1/4	3c	1/4x3	25c
3/16x3/8	4c	3/8x3	30c
3/16x1/2	5c	1/2x3	35c
3/16x5/8	6c		
1/4 sq.	3½c	**PLANKS**	
1/4x3/8	4c	1x3	50c
1/4x1/2	6c	1x6	90c
1/4x5/8	7c	2x2	60c
1/4x3/4	8c	2x4	$1.20
5/16 sq.	5c	2x6	1.80
3/8 sq.	6c	3x3	1.50
3/8 1/2	8c	3x6	2.70
1/2 sq.	9c	4x4	2.50
3/4 sq.	15c	4x6	3.70

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3/32x3/8	3c	3/16x3/4	6c
1/8x1/2	4c	7/32x3/8	7c
5/32x5/8	5c	1/4x1	8c

Propeller Blocks

8x7/8x1-3/16	6c	16x1-1/2x2	26c
10x1x1-1/2	10c	18x1-3/4x2	32c
12x1x1-1/2	12c	9x1-1/2x2	15c
14x1-3/16x1-3/4	18c	10x2x2-1/4	25c
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Aero Coil, Lt. Wt. Quality	$2.50 3.00	Control Wire, 100' 010, 012, 014, and 016, 140	65c 75c
Austin Coil	2.50	Flexible Leads	25c
Competitor Coil	1.95	M.T. Wheels 2½"	1.00
Herkimer Coil	3.00	Sponge Rubber Wheels	
Aero Metal Cond.	0.35	2"	.40
H.T. Leads	0.15	2½"	.50
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Soldering Lugs	6/5c	2½" Heco Air Wheels	2.15
Fahnstock Clips	2/5c	Heco Sponge Tail Wheels,	
Toggle Switch	50c	Alum. Hub 2½"	10c
Slide Switch	30c	1½"	15c
Tip Jacks, Set	60c	Hely Arc 1½"	45c
Pee Wee Clips, ea	10c	2" 50c; 2½	75c
Alligator Clips, ea.	10c	Plastic Spinner	75c
Spark Plugs, V, V2, V3, VR1, VR2, ea.	50c	**Gas Propellers**	
Austin Timer	1.50	Flotorque 8"-14"	50c
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Neoprene Tubing, Ft.	25c	8" or 9" 35c 45c	
Plastic Tank	85c	10" 40c 45c	
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Control Handle " " alum.	75c 1.25	Tubes Cement, Sm. Lg.	5c 10c
Flightline Reel	1.00	Birch Dowels, 3"	
Sullivan Reel & Hdl.	1.25	1/8, 3/16, & ¼" ea.	5c
Music Wire, 3 Ft. .020 & .030, 3c; .035 & .040, 4c; 1/16, 5c; 3/32, 10c; & 1/8, 15c		Scotch Insulating Tape, Roll	25c
		Washers ⅛" doz.	5c
Tissue, All Colors	5c	¼" "	7c
Silkspan, 00	5c	Ball Bearing, Sm. Lg.	10c 10c
Silkspan GM 10c, 3/25c		Plastic Wheels, ⅝" 4c pr.,	
Bamboo Paper, Red, Yellow, Blue, Green, White ea.	10c	⅞" 5c pr., 1¼ 7c pr.	
Balsa Props, 4"-4c, 5"-5c, 6"-6c, 8"-8c, 10"-10c, 12"-12c, 14"-16c, & 16"-20c		Birch Wheels, 1", 5c pr.	
		Balsa Wheels, 1½, 20c pr.	
Prop Shafts, Sm. Lg.	6/5c 6/10c	Alum. Tubing, ⅛" OD, 1/16 OD, 3/32 OD 15c ft.	
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500 ft. danger signal. A bright light flashes in the cockpit to warn the pilot of danger. Hughes has ordered installation of the device on all TWA transports and will offer it at cost to all other airlines that want to use it. Admitting it is not the final answer to the complete radar-equipped airliner, Hughes points out that it is here—now—and will do a badly needed job immediately.

SO SATISFIED is CAA with flight tests of its new castoring landing gear that it has ordered installation on a Douglas DC-3 as a test of transport size installations.

THE NAVY REVEALED details on the "Neptune" a supermissile designed to reach an altitude of 1,255,000 ft.! (approximately 237 miles). The "Neptune" is a "cleaned-up" V-2 of much smaller diameter but of equal length and comparable in thrust, speed and load-carrying ability. A feature of the new missile, which will be used for upper atmosphere research work, is a movable rocket motor in the tail which may be moved to change the direction of thrust and thus control the direction of flight. The giant missile is being built by Glenn L. Martin Co. and is expected to make its first test flight at White Sands early next year.

ALTHOUGH LITTLE commercial success has ever attended their efforts, designers are still toying with the one-place light-plane. Latest experimenter is Al Mooney, former chief engineer of Culver (before its dissolution). Mooney is aiming at the "minimum" airplane goal and will power his new creation by a Crosley 25 hp automobile engine. The landing gear will be mechanically retractable and the craft resembles the familiar Culver PQ target planes, of which several hundred were used by AAF. Mooney claims a 100 mph cruising speed for his single-seater but, more important, hopes to attain an economy of 60 miles to the gallon!

AAF IS expected to flight test a single-place jet helicopter shortly. No other details were announced but it is emphasized that the power will be jet and not simply the operation of the anti-torque system.

THE ROADABLE airplane has usually seemed only an experiment, but the plans of Robert Fulton go far beyond that. He is now nearing completion on a new version of his *Airphibian* and will submit it for CAA verification tests. Fulton completely redesigned and rebuilt the 150 hp engine and plans to use a 4-blade Sensenich propeller for further noise reduction, although the *Airphibian* is already one of the quietest airplanes. Fulton is still highly secretive about such details of his device as its transmission system, method of control, etc. but is entirely serious in his plans to manufacture the design.

PROGRESS REPORT on the Pentacost *Hoppicopter* reveal it still growing in complexity, size, weight and cost until some observers are convinced that what started out as a small back-pack will wind up a full-fledged helicopter. Pentacost stated that he hoped to market the design for $1,000 provided quantity production could be assured. The device now mounts on a tripod stand in which the operator sits and has several new controls.

ONE OF THE most momentous postwar flights took place recently when a Vickers-Supermarine *Spitfire* fighter crossed the Atlantic without incident. The single-seater, piloted by an Argentine pilot, covered the 1800 miles from Dakar to Natal, Brazil, in 8 hrs., 40 mins.

THE GIANT CONVAIR B-36 is equipped with an "airborne subway," an 85 ft. long, 2 ft. dia. tube from flight deck to gunner compartment aft through which a passenger propels himself by lying on a scooter and pulling hand-over-hand on an overhead cable. The tube is pressurized and extends through the bomb bays of the huge craft.

PHOTO CREDITS

Page		
2	*Above*	Press Assoc.
	Below	Official U.S. Navy Photo
17	*All*	Les May Studio
26	*All*	A. U. Schmidt
31	*All*	Robert C. Hare
78	cartoon	New York Mirror

Model Finishes

(*Continued from page 29*)

do freelance work at color scheming, it will be well to summarize the effectiveness and principles of modern color combination. The seven colors of the spectrum are: violet, indigo, blue, green, yellow, orange and red. White and black are regarded as achromatic or neutral colors, and the various shades produced by combining the basic spectrum colors and perhaps adding white or black give us our chromatic hues.

Keep in mind that warm colors such as yellow, orange, red, or neutral white contrast best with cold colors such as blue, green, grey, or neutral black.

Always select your dominant color with an eye to the type of model you are about to paint. For example, military planes appear more realistic and effective when dominated by grey, brown, blue or white. Private planes are a bit more on the jaunty side and lean toward extensive use of the warm colors; while commercial planes are almost exclusively silver if of the all-metal type. Restrict the number of colors as much as possible for military models. Few color schemes are more attractive than whites and greys used by the Army and Navy which always give a sleek business looking appearance. Over-detail of construction and likewise over-decoration produces a heavy, loaded-down effect. Rivet patterns, hinges and cowling seams are details that are easily obscured by paint and should be covered with light shades.

Stripes are always good taste when styled conservatively and located in the right places. When applied longitudinally to the fuselage they should be relatively narrow. They look well when designed to a fine taper. The popular modern design of diminishing parallel lines is used to best advantage on areas forward of the cockpit. Broad vertical bands for background of flight numerals should be edged with a contrasting color. Scallops on the leading edges of the wing and tail surfaces are not widely used in present day design; they are rather difficult to apply but are acceptable if the radii are in proportion to the surface. Wing stripes should be used only on biplanes since monoplane design does not permit them to be joined in angle fashion near the wing leading edge. Lack of this closed angle feature renders wing stripes unattractive because it suggests a droopy appearance for the total wing area.

PAINTING AND RUBBING—In addition to your selection of brushes and paints you will need the following supplies to complete your project: several small clean cotton cloths, an old felt hat, paraffin rubbing oil, FF grade pumice stone, rotten stone, several sheets of 7/0 grade waterproof sandpaper, and a few short thin sticks of wood.

After the filler operation is complete, wipe the surface clean with a cloth slightly moist with turpentine. This will give the paint a good footing. Mix the paint thoroughly and apply it conservatively, using as long a brush stroke as possible. Keep the brush strokes going in one direction. If the paint runs or sags, take up the excess by going over the area with a fairly dry brush. If you find it is hard to spread or pulls, add a little olive oil or glycerine. Allow the paint to become bone dry before progressing further. Room temperatures and humidity are determining factors in drying time, which may vary from 24 to 48 hours.

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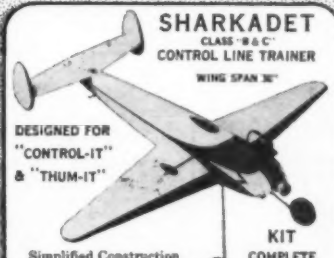

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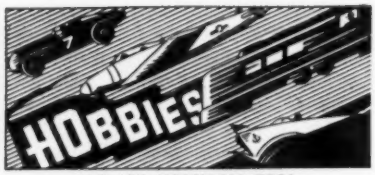

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tain rubbing processes are necessary which are performed in part by using pumice stone and either water or oil. You may, at your discretion, substitute waterproof sandpaper and water for pumice and water, or waterproof sandpaper and oil for pumice and oil.

When the first coat of paint is dry you are ready to rub it with pumice and water (or waterproof sandpaper and water). This operation removes all dust and dirt particles that have collected on the paint while drying. It also has a leveling effect on the areas where brush strokes overlapped. Cut a small piece from the felt hat about 1" x 2" and place about a teaspoon of pumice stone in a saucer. Wet the felt with water, then dip it into the pumice. You now have an abrasive paste. Some finishers mix up a supply of this paste and use it in that form. Either method is correct. Now select an area on which to commence. The wings are always a good place to start because of the simplicity of design. Rub the felt pad (or sandpaper) lightly back and forth, always progressing in one direction. Rub only enough to cut off the gloss from the paint and dirt nibs. Make sure the surface is always well lubricated with water and be careful not to rub through the paint. Add more pumice occasionally so that a uniform mixture is used throughout. Cut other pieces of felt to meet the requirements of various curves. It may be necessary to glue small pieces of felt to the wood sticks in order to properly rub some of the more irregular spots.

When you have completely covered the first coat by rubbing, clean up with a soft cloth dampened in water to remove all traces of pumice and paint particles. It is well to go over the plane again with turpentine. You are now ready to apply the second coat of paint.

Repeat the foregoing process of painting and rubbing until you are satisfied that a sufficient number of coats of paint have been applied. Some colors require three coats and others four. Bear in mind that each rubbing has taken off some of the paint, so don't skimp.

The last coat should be rubbed with oil instead of water. The procedure is exactly the same as when rubbing with water, and you will notice that a "finished" look is finally being born. Make sure you have calculated right before commencing the last rub because you will be using oil and any subsequent coats of paint may crawl or behave even worse. In the event you have misjudged, it will be necessary to carefully clean off all traces of oil before the next application. Be extremely cautious with the final oil rubbing and don't cut through the paint.

After you have removed the residue of pumice and oil with a dry clean cloth you should decide at this point if you want a high gloss finish or the dull luster now present. If you prefer the dull finish, all you have to do is to carefully wipe the model with a soft cloth dusted in corn starch. If you want the high gloss, continue with the following instructions:

Make sure that no grit or dirt is present. Saturate a clean piece of felt with rubbing oil and wipe it over a relatively small area. Dip the moist felt into a saucer containing some of the rotten stone and apply it to the oiled surface with a circular motion. Naturally it won't be possible to use the circular motion on all surfaces but you should maintain it when you can, especially on the larger surfaces.

As a result of this process, the oil and rotten stone combine to make a hard and durable glass-like coating. Clean up the surface occasionally for inspection. A

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little practice will tell you how much time to spend in one spot. When you have completed the polishing, clean up first with a dry cloth, then with a little turpentine, then with a clean soft cloth again. The more buffing the better the gloss.

If a metallic gold paint has been used in your design, it should be protected by a coat or two of clear varnish; otherwise it probably will tarnish from exposure. This condition will not occur with silver paints.

Model Airplane Course for Beginners

(*Continued from page 31*)

cut out. Sandpaper the outline. Round the leading and trailing edges with 2/0 sandpaper. Note that the rudder assembly includes a fillet or dorsal fin also cut of 1/16" sheet.

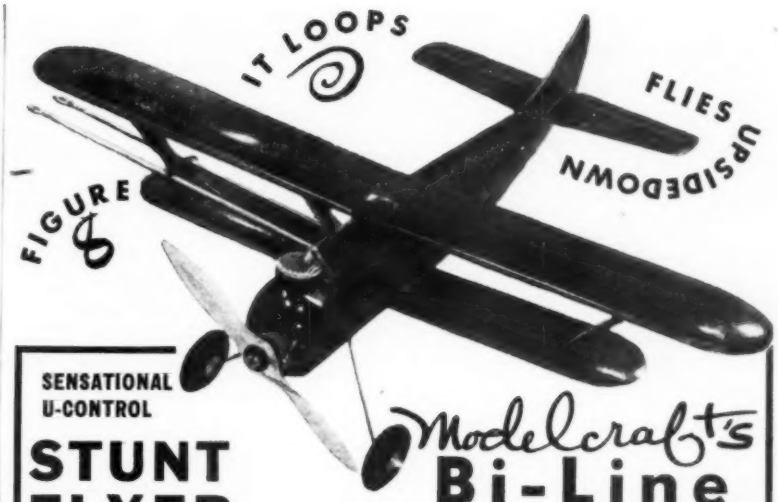
Wing—The wing consists of two panels each maintained in proper form by two ribs. The main panels are cut of 1/32" sheet balsa shaped as indicated in the plans. The ribs are made of 1/16" sheet balsa. True size and shape of these is shown in the side view of the model; indicated in solid black, their outline is easy to follow. Locate the ribs as shown in top view of the wing panel and cement into place. Hold the balsa panel to the rib contour with pins until the glue has hardened. Note that a tip rise of 5/8" is used in each panel. To achieve the correct dihedral angle, cement the two inboard ribs at an angle as shown in front view of the wing panel assembly. A wing mount section of 1/8" hard balsa sheet is made as illustrated by the shaded area of the side view drawing. When cut to outline shown, the mount automatically provides for proper incidence angle. Fig. 18 illustrates the position of the wing mount relative to the wing panels. Cement is used to hold the assembly together. In general, the method of constructing the wing of the profile model is similar to that described in our previous lesson for the R.O.G. wing assembly.

Propeller—The propeller is carved from a piece of balsa 4-1/4" long, 5/8" wide and 3/8" thick. The detail procedure for carving the prop, after the outline has been drawn on the block, is best illustrated by the "film strip" in our previous lesson. Referring to this and to the instructions that accompanied it, carve and finish the prop to shape required.

Wire Parts—All wire parts are formed of 1/32" music wire. These include prop shaft, rear hook and landing gear. Referring to the full size plans, these are formed with long nose pliers and clipped to size with the wire cutter. Fig. 14 of Lesson 3 illustrates the method of forming wire parts.

Assembly—Final assembly is the finishing stage of construction. The rudder and dorsal fin are first cemented to the fuselage. Allow sufficient time for the cement to harden; then slip the stabilizer through the slot provided and glue. Make certain the rudder is perfectly vertical and the stabilizer horizontal when assembling the units to the fuselage.

Assembly of the landing gear to the body should prove simple. Apply sufficient cement and wrap with thread to insure a strong and permanent joint. After this is done, slide the forward end of the prop shaft through the thrust bearing and through the hole in the propeller hub. Bend the front end of the shaft into



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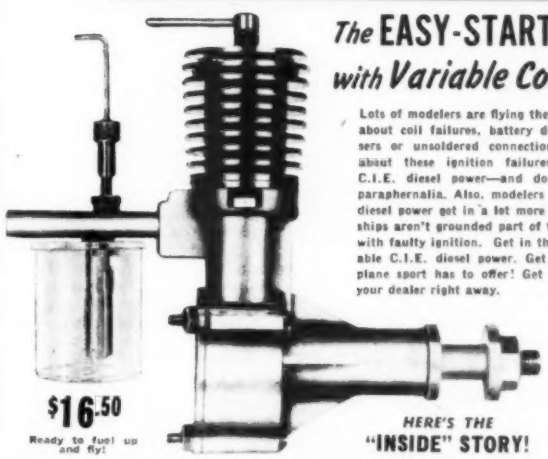

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an "L" shape and insert the short end into the propeller, then apply a liberal coating of cement. Remember, of course, to place a bead or washers on the shaft to reduce friction between the prop hub and thrust bearing.

As shown in the plans, the wing mount fits into a recess cut on top of the fuselage and is held into position by the rubber loops.

Powerplant—A loop of 1/8" flat brown rubber about 7" long is used to power the model. The rubber loop is fastened to the prop shaft at one end and to the rear hook at the other.

Balance—As in all flying models, proper balance is essential to good flight performance. When completed and ready to fly, the model should balance as shown in the plans. If this point of balance does not coincide with that of your finished ship, add a sufficient amount of modeling clay to adjust the balance as required. The clay is put on the underside of the fuselage near the nose. This procedure may be necessary in view of the fact that the wing position is fixed and cannot be altered as in our previous model.

Flying—The procedure followed in testing the flight characteristics of the model is similar to that practiced with the R.O.G.; check surface alignment, and test glide with and without power. Flight instructions are no different than those described in Lesson 3. Corrections for any misalignment or erratic flight behavior are also identical.

Construction time for the profile model should be 6 to 8 hours. Flying time during the lifespan of the model should total many times this, but before going out for that test hop, stay with us a little longer while we answer some of the questions in our mail box this month.

* *

David Norris of Houston, Texas asks:

QUESTION: What is aspect ratio?

ANSWER: The ratio between the wingspan (measurement from tip to tip) and the chord (measurement from leading to trailing edge) is known as aspect ratio.

$$\left(\text{Aspect ratio} = \frac{\text{span}}{\text{chord}}\right)$$

William Levy of Los Angeles, Calif., asks:

QUESTION: What is rubber lubricant and why is it used?

ANSWER: Rubber lubricant is used to increase the potential energy of rubber and to permit more turns to be stored in it. C. G. Grant's "Model Airplane Design" manual indicates that lubricant increases potential work of brown rubber about 25% and increases turn capacity 50 to 60%. One of the best lubricants is a mixture of one part glycerine with three parts liquid green soap.

James Ryan of Tulsa, Oklahoma, asks:

QUESTION: What is the difference between a straight pitch and helical pitch propeller?

ANSWER: A straight pitch propeller is one in which the entire blade surface from hub to tip is at the same angle to the plane of rotation and shaft. A helical pitch blade is parallel to the shaft at the hub and twists gradually as we approach the tip. The propellers carved for the R.O.G. and the profile model are typical examples of helical pitch props.

* *

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New Power Units

(Continued from page 15)

8400 rpm with a 9" diameter 4" pitch propeller also were obtained. The engine operates on a mixture of three parts ether and one part heavy mineral oil. The cylinder is machined from aluminum alloy and provided with a ground and hardened alloy steel liner in which the hardened cast iron piston travels. Power is transmitted to the alloy steel crankshaft through an aluminum alloy connecting rod of extra large crossection to take care of the high loads imposed by a compression ratio of 18 to 1.

The crankcase is a machined aluminum alloy sand casting. Four screws secure the aluminum alloy cylinder head to the cylinder. A ratchet-type spring provides for positive setting of the needle valve, and a special attachment for free flight use is available to throttle the engine down to idling speeds. This attachment also acts as a shut-off valve for flight timer operation. The screw-type intake tube is adjustable for operation in any position. An aluminum alloy fuel tank mounted on the crankcase holds sufficient fuel to run the engine 2-1/2 to 3-1/2 minutes. The cylinder bore of 21/32" and stroke of 7/8" makes the stroke-bore ratio of 1.33 to 1.

Operating on a mixture of naphtha, ether, and S.A.E. 40 oil, the *C.I.E.* "Diesel" Class A engine is stated to turn a 9" diameter, 6" pitch propeller 6000 rpm. The cylinder of this engine is turned from aluminum alloy bar stock and fitted with a Meehanite liner and chrome moly steel head. Hardened chrome moly steel also is used for the piston. The tubular steel connecting rod is equipped with a tin base crankpin bushing. No bushing is required at the upper rod bearing because of the provision of a bronze piston pin. The main crankshaft bearing is Oilite bronze. The crankshaft is cast in a permanent mold from 356 heat treated aluminum alloy. Four bolts attach the cylinder to the crankcase. The cylinder bore is 1/2" and the stroke 3/4", thus providing a stroke-bore of 1.50 to 1, and a piston displacement of .147 cu. in.

A fixed compression ratio of 13.50 to 1 and a combination throttle and engine cutoff are features of the Class A *Mite* "Diesel." Both the bore and stroke are 1/2". A stroke-bore ratio of unity is unusual in compression-ignition engines but is favorable to lightweight construction. The bore of the steel cylinder is honed and lapped to a finish. Dual exhaust ports are used. Both the piston and connecting rod are fabricated from 4130 alloy steel. The upper rod bearing is of the ball and socket type, the socket being made of 24 S-T aluminum alloy. Other features of the engine include a one piece alloy steel crankshaft, bronze main bearing, a throttle and throttle arm made from 17 S-T aluminum alloy, and a shaft-type rotary valve. The engine weighs 2.60 oz. Due to the short stroke and other features of design, this engine has a relatively high rpm, turning over 9000 revs with an 8" diameter prop of 6" pitch. The AMA Class I control line record speed of 67.6 mph was established by a *Mite*.

The first American-built Class C "Diesel" model engine to appear on the market is the Edco, produced by the Engineering Development Co., Inc. It has a displacement of .45 cu. in., and is stated to weigh only 14-1/2 oz. The steel cylinder is lapped to final finish and provided with a mounting flange which is bolted to the aluminum alloy crankcase exten-

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1/16x1/2	...5, 5c	1/4x3/8*	2c ea.
3/32 sq.	10, 5c	1/4x1/2*	2, 5c
3/32x3/16	7, 5c	1/4x5/8	2, 5c
3/32x1/4	...5, 5c	1/4x3/4*	3c ea.
3/32x3/8	...4, 5c	1/4x1*	4c ea.
3/32x1/2	...3, 5c	5/16 sq.*	2, 5c
1/8x1/8*	7, 5c	3/8x3/8*	3c ea.
1/8x3/16*	...6, 5c	3/8x1/2	4c ea.
1/8x1/4*	...5, 5c	3/8x3/4*	4c ea.
1/8x3/8*	...4, 5c	1/2x1/2*	4c ea.
1/8x1/2*	...4, 5c	1/2x3/4*	5c ea.
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6"- 5c	9"- 7c	8-10"-
7"- 8c	10"- 9c	11"- x
8"- 8c	11"- x	12"- 10c
9"- 9c	12"- 10c	13"- x
10"- 9c	13"- x	14"- 12c
11"- x	14"- 12c	15"- 15c
12"- 10c	15"- 15c	16"-
13"- x	16"-	18"-
14"- 12c		
15"- 15c		
16"-		
18"-		

PLASTIC
2 Blade 3bl 4bl
2c 10c 10c
15c X 15c
3c 15c X
5c 15c 20c
10c 20c X
15c 30c 30c
20c 50c X

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1 oz. 7c, 2 oz. 10c
½ pt. 40c, pt. 65c
Gal. Exp. Col. 2.95

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10 Asst. Colors
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1 oz. 9c, 2 oz. 15c
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⅝"	...5c pr.
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1¼" 5c; 1¼" 7c

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1½" pair	40c
2" "	50c
2½" "	65c
3" "	75c
3½" "	95c

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1½"-3Bc 1¾"-4Sc
2"-5Sc 2½"-6Sc
SOLID DURAL 1" or 1¼" ea....30c

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.034 .040 3 ft. 4c
.049 1/16" 3 ft. 5c
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.032 or 1/16....8c
.032 or ⅛....10c
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.003-.005....25c
.010....35c
1/16x3x12....55c

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¼x¼x12"....35c

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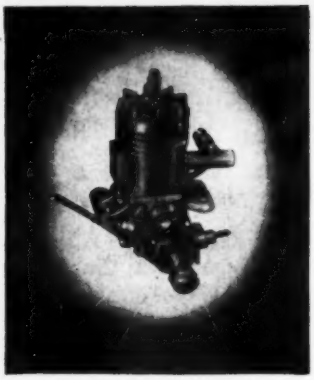

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sion. The latter incorporates twin exhaust stacks. Both the crankshaft and piston are fabricated from steel, hardened and ground. A floating bronze insert is supplied at the lower end of the forged aluminum alloy connecting rod. High-speed bronze is used for the main crankshaft bearing. The engine has a compression ratio of 19 to 1.

Equipped with hot coil ignition, the *H & H* Class C engine was developed before the war and perfected during the time that restrictions limited its manufacture. It operates on a mixture of 70% alcohol and 30% castor oil. To start the engine the special coil in the cylinder head must be heated by connecting it to two dry cells hooked in series. After the engine is primed by putting the finger over the inlet to the mixing valve and spinning the propeller two or three times, an explosion occurs. It is recommended that a starter then be used to spin the engine at a high speed. As soon as the engine is running the battery is disconnected, no external ignition system being required because the coil remains incandescent. The cast iron cylinder, which has an aluminum alloy head, is threaded and screwed to the aluminum alloy crankcase. A bore and stroke of 7/8" and 3/4" respectively provide a piston displacement of .451 cu. in. and a stroke-bore ratio of .86 to 1. The piston and crankshaft are made of steel, and the crankshaft bearing is bronze-bushed.

Most spark-ignition engines of the high speed racing type with substantial sand-cast cylinder and crankcase construction are in the .60 cu. in. displacement class or over. An exception is found in the recently introduced *McCoy 49*, which is similar in design to the large McCoy engine for model planes and racing cars. Like the latter engine, the aluminum alloy piston is equipped with two rings to guard against compression leakage, and the crankshaft with ball bearings to reduce friction. The aluminum alloy crankcase and cylinder are cast in a unit, which eliminates another point where leakage may occur. The cylinder liner is Meehanite, a ferrous material now used almost universally for this service because of its special advantages. Other features of the engine are a drop forged 24 S-T aluminum alloy connecting rod and a disk-type rotary crankcase admission valve. The manufacturer states the output of this engine has exceeded expectations and that a horsepower curve will be supplied as soon as tests have been completed. It is stated the engine will turn a 9" diameter, 10" pitch propeller 13,000 rpm when on the ground.

A new make of engine in the low-priced field is the *Everson "29,"* which is sold direct to the user. Despite its low price, it possesses such features as a honed Meehanite cylinder liner, heat-treated centerless ground steel piston, aluminum alloy castings with frosted finish, and a shaft-type rotary valve. The connecting rod is made of bronze, and the main crankshaft bearing of high-speed bronze. With a compression ratio of 8 to 1, this engine turns an 11" diameter, 8" pitch propeller 7500 rpm, and has a weight without accessories of 7-3/4 oz.

Steel is employed extensively in the *Tom Thumb* Class C engine, this material being used for the cylinder, connecting rod, and for the piston which is fitted with two rings. The steel cylinder head is brazed to the cylinder, and the latter is threaded and screwed to the die cast crankcase. Both the lower rod and main crankshaft bearings are bronze-bushed. With a weight of 7-1/4 oz., this engine

turns an 11" diameter, 6" pitch propeller 10,000 rpm. Piston displacement is .45 cu. in., and a compression ratio of 6 to 1 is used. The bore and stroke are 7/8" and 3/4" respectively, and the engine weighs 7 1/4 oz.

A different and novel approach to the development of a powerplant without electric ignition equipment has been made by the Herkimer Tool and Model Works with the introduction of an expansion type reciprocating engine that operates on carbon dioxide stored in a special cartridge or steel cylinder. Designed for model planes with wingspan up to 36", the *O.K.* carbon dioxide engine has a bore of .275" and a stroke of .300". These cylinder dimensions make the displacement .0178 cu. in. It has a maximum speed of over 7000 rpm, the speed being controllable, and a weight of only 3/4 oz. bare. With accessories the weight is 2-1/2 oz. The cylinder is made of 1% carbon steel and is finned and ported.

A few revisions and additions to the specifications of model engines listed in the December 1946 and April 1947 issues of MODEL AIRPLANE NEWS are to be noted.

As in the cose of the larger *Arden* model, the crankcase of the .099 cu. in. displacement engine now is cast from aluminum alloy instead of magnesium. With this change the bare weight of the engine is 2.62 oz., and the weight per cu. in. displacement 1.63 lb. The manufacturer states the change to aluminum alloy was made purely for improved appearance.

The cylinder bore of the *Phantom P 30* is now given as .711" instead of .715". Since the stroke remains .75", the piston displacement is .298 cu. in. The bare engine weight is now stated to be 7-3/4 oz., which makes the weight per cu. in. displacement 1.63 lb. A cast iron piston is used, and the cylinder walls are chromium plated.

The *Super Champion Model JH* now is stated to have a compression ratio of 6.50 to 1 and a bare engine weight of 12 oz. Weight per cu. in. displacement is 1.20 lb. A bronze bushing is used at the lower rod bearing. The *Model J Atwood Champion*, which sells at a lower price than the *Super Champion*, has a piston displacement of .603 cu. in.—slightly less than that of the *Model JH*—and a crankcase with a black crackle finish.

Both the *Hornet* and *McCoy 60* engines have pistons equipped with rings. This information was not included in the original table.

An improved *Ohlsson 23* is now in production. The general specifications are the same as those that have already been listed, but refinements include an increase in the exhaust port area to insure better scavenging of the burnt charge, an enlarged intake tube boss to provide additional strength, and the addition of more crankcase cooling fins. The engine is designed for radial mounting, the old style lugs for beam mounting have been eliminated, but an accessory beam-type mount is available. A rotary valve now is available for Ohlsson engines as extra equipment.

It may be mentioned that an Italian compression-ignition engine, the *Movo D-2* "Diesel," now is on sale in the United States. It is a Class A engine with a piston displacement of .125 cu. in., weight 5 oz., and swings an 11" diameter propeller at 6200 rpm. This engine has variable compression and is of typical continental design but is well made, attractively finished and reliable in operation.

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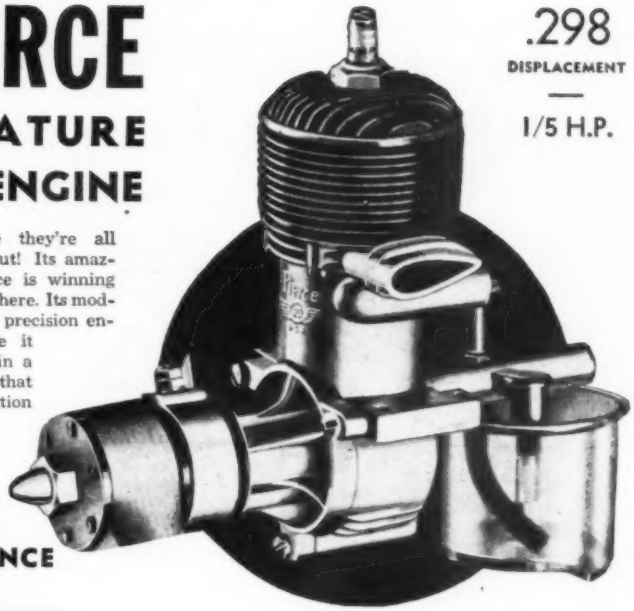
MINIATURE GAS ENGINE



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Longer Flight—

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8" or 9"	35c	45c
10"	40c	45c
11"	40c	50c
12" or 13"	45c	60c
14"	50c	65c

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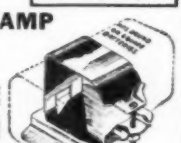

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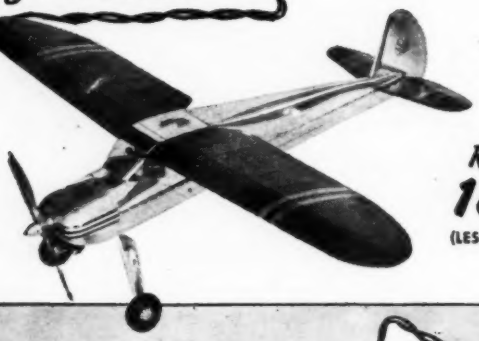

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HOBBY CRAFT 111½ North 40th Street OMAHA, NEBRASKA

Nationals! 1947

(*Continued from page* 12)

hope for the best and expect the worst. Let's hope they're pleasantly surprised when they get to the Nationals.

Clarence W. Hinck, State Director of Aeronautics for the Legion in Minnesota, and General Chairman for the Nationals, predicts all attendance records will be broken this year. Joe E. Rabinovich, Chief of the Legion's national Special Activities Section, and Frank Nekimken, Assistant Chief and Contest Director for the '40 and '41 Nationals, agree with Mr. Hinck. Cooperating groups assisting in the competition are: Junior Chamber of Commerce, Minneapolis Park Board, Minnesota Aeronautics Commission, The Exchange Club, Chamber of Commerce, newspapers, hobby clubs, and model industry leaders from St. Paul and Minneapolis.

Meet manager is William Crockett, Senior Recreation Supervisor of the Minneapolis Recreation Department. "Bill" Crockett is an excellent choice for the job knowing as he does both model aviation and the ins and outs of contest promotion. He became interested in model aviation when the Park Board assumed sponsorship of the *Minneapolis Model Aero Club* about 8 years ago. Bert Pond, Bob Toft and Bob Champine were some of the boys who initiated him into the mystic order of "Thermal Seekers." Mr. Crockett is 36, married, and—until he took over the job of managing the Nationals—had no gray hairs.

President of the headaches dept. is Paul J. Ring who was named Contest Director. Mr. Ring says his main job will be to see that every contestant gets an equal and fair deal. Sounds good to us! "PJR" is a youthful looking 38 year old grandfather and has been in the radio service business for over 25 years. Seven years ago he added hobby merchandise and hasn't had a moment to himself since. Paul is the oldest member of the *Minneapolis Model Aero Club* and is a long-time AMA industry leader member and contest director. Like Everett N. Angus, Academy President, Mr. Ring has his own movie equipment and travels around to schools and clubs stirring up interest in modeling. When it comes to selling hot dogs and soda pop at club meets to help swell the treasury, Mr. R. has been proclaimed the best salesman in all "Paul Bunyan land."

Tentative schedule of events (subject to change) calls for registration of contestants to get underway at 12 noon on August 18. Operating headquarters will be set up at Monticello since it is expected most entrants will stay out there.

A trailer camp will be established there, plenty of a.c. power for soldering irons is planned, plus a complete spray shop. All the tourist cabins, "motels," and hotels in the vicinity have been commandeered; rates will be nominal. Barracks and summer camps have been taken over and contestants will be permitted to stay there without charge. All they need do is bring their own cots and bedding. These facilities are all not more than 1 mile from the outdoor flying site, so transportation back and forth should present little problem to the flyer.

Back to the time table: On the evening of the *18th, a Monday,* the contestants' meeting will be held. At this session entrants get a chance to meet all the officials and go over the rules and contest procedure so there will be few misunderstandings on the day of battle.

Tuesday, August 19, will find the Class A free flight events underway, with outdoor rubber powered stick models, radio control, and control line speed and stunt categories all in operation. That night the entries in the flying scale event will be checked for workmanship and scale. An open meeting of the AMA contest board will be held.

Wednesday, August 20, calls for Class B free flight models, rubber powered cabin models of "Wakefield" proportion, flying scale models, radio control, and speed and stunt U-control.

Thursday, events will be held for Towline gliders, Class C free flight models, radio control, stunt and speed U-control.

Friday, August 22, the last day of the meet, will be devoted exclusively to indoor models in the University of Minnesota field house, in Minneapolis. This will give the meet officials all day to tabulate outdoor results, mark trophies for presentation, and the outdoor fans can loll in the reserved seat section of the auditorium and watch the microfilm maniacs at work. Indoor events will be run off for hand launched gliders from 8 to 10 a.m.; fuselage r.o.g. and stick models for the remainder of the day.

The annual victory banquet will get underway at 7:30 p.m. at the Radisson Hotel, in-town meet headquarters. Among the many traditional awards which will go to winners will be the Fred W. Megow trophy for the club placing highest in the meet, and the National Exchange Club trophy to the entrant amassing the most points and capturing the title of national champion. It is expected that 2000 will attend the victory gathering.

All the traditional prizes will be on display here and will make an impressive picture along with the hundreds of permanent awards. Each "perpetual" prize which must be returned the following year by the winner is accompanied by a permanent award which he or she keeps for all time.

Entry blanks for the Nationals may be obtained from the American Legion, 777 N. Meridian St., Indianapolis 6, Ind.

Everything points toward the 16th annual brawl being the biggest and best in the history of the sport. Better plan now to take it in, either as a contestant or as a spectator.

See you in Minneapolis!

Cockpit Radio Control

(*Continued from page* 21)

The receiver embodies the conventional superregenerative circuit, details of which have frequently been described elsewhere. Receiver output is fed to a sensitive relay in the usual manner. We used a homemade version of Walter Good's polarized relay and found it lighter, more sensitive and less susceptible to the effects of temperature change and engine vibration than even the commercially built relays of the spring loaded type.

The airborne control unit itself comprises an automatic selector switch and a motor driven servo unit for each control—in this case one for the rudder and one for the engine spark timer arm.

The selector switch (see Figs. 2 and 3) consists of a selector magnet, a commutator disc on which is mounted a series of fixed contact points, and a rotor arranged to traverse the contact points. The rotor is mounted on a common axis with a ratchet wheel and is advanced step by step around the commutator disc by means of a pawl carried by a spring loaded armature on the selector magnet.

The fixed contact points on the selector switch are connected with corresponding

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control servo motors through a switch formed by the selector magnet armature and a stationary contact point with which it engages. Each servo motor is geared to a threaded shaft which serves as a lead screw to drive a nut coupled to the control cable. (See Fig. 4.) Limit switches at the extremes of travel of the nut break the motor circuit to prevent the nut from overrunning its travel range and jamming.

In operation, the transmitter is keyed so that the carrier is propagated in a series of short selection pulses, followed by a long control pulse. Each of these pulses, when detected by the receiver, causes the sensitive relay to close, and the relay in turn energizes the selector magnet so the pawl and ratchet assembly will advance the selector rotor to the next contact point on the commutator disc. The short pulses move the selector rotor around the commutator disc to the contact point corresponding to the control motion dictated by the ground control station. The last pulse in the series, the long control pulse, causes the servo motor to be energized for the period of time required to move the control to the desired position.

Since each of the servo motor circuits is completed through the selector magnet switch, the servo motor will be energized only at times when the selector magnet is energized. Thus the servo motor will stop rotating as soon as the selector magnet is de-energized at the end of the carrier pulse.

Each of the short selection pulses actually moves one of the controls a slight amount, but since the controls are connected in sequence to the selector switch, the small control travel due to any one momentary contact is neutralized as soon as the selector rotor steps to the next contact point. We found, moreover, that because of the inertia of the servo motors and the short period of the selection pulses (on the order of 0.1 second), there was no perceptible control movement during selection.

Because we used only a single selector switch commutator, it was necessary to use two sets of batteries for each servo—one for each direction of control travel—since the direction of rotation of the servo motors is determined by the polarity of the voltage applied to them. We did some experimental work in an attempt to operate all the servo motors from a single battery source by adding a second commutator disc to the selector, but the necessary machine work proved too complex for our limited workshop facilities.

The ground control station consists of a transmitter and a ground "cockpit" or control console.

The transmitter is of a conventional type, powered by a six-volt automotive type storage battery in series with a 30-watt dynamotor. We found it convenient to mount the transmitter power supply in the same case with the transmitter, connecting the control console with the transmitter by a 50 foot cable. It was thus possible to mount both the transmitter and the console for greatest convenience and operating efficiency.

The control console is the most complicated unit in the system. On it are mounted the joystick and throttle lever with which the ground pilot flies the model airplane. Its function is to translate the operator's control movements into the pulses necessary to operate the system. In effect it is an automatic device for keying the transmitter.

The control console contains a selector switch which is essentially a duplicate of the selector switch in the airborne unit, a relaxation oscillator, a monitor servo corresponding to each of the servo units in the model, and a number of relays.

Each monitor servo has an electric motor of the same type as the airborne servo motors, driving a similar threaded shaft and nut arrangement. (See Fig. 5.) Instead of moving a control cable, however, the nut on the monitor servo carries a brush which slides along a rod parallel to the lead screw. The rod compromises two electrically conductive lengths with a short insulating section between them. It is slidable in a direction parallel to the lead screw and is mechanically linked to one of the control

levers so that movement of the control lever by the operator moves the rod a corresponding distance.

Operation of the console is best understood by reference to the circuit diagram, Fig. 6. This diagram has been somewhat simplified in that it shows connections for only one of the control units; but the other unit or units would be connected into the circuit in exactly the same way as the one shown.

When a control lever is moved by the operator, the corresponding servo monitor rod is moved with respect to the brush contact carried by the nut. Assume, for example, that the control shown in Fig. 6 is the rudder, and that the operator moves the "stick" to the left for a left rudder response. Since the "stick" is pivoted, the monitor rod is moved to the right with respect to the brush contact, thereby completing a circuit from the battery through the brush and the left-hand conductive portion of the rod to the relay K_1.

When relay K_1 is energized, the oscillator circuit is closed through one of its three poles, and the oscillator begins to energize the relay K_0 in a series of pulses. The rapidity with which relay K_0 is opened and closed, corresponding to the selection pulse rate, depends upon the value of resistor R_1 in the oscillator circuit. (See Fig. 7.)

Each closure of the oscillator relay K_0 closes a circuit which sends a pulse of 6 volt current from the battery supply to the transmitter keying relay K_X and simultaneously to the selector switch magnet. Since the transmitter is thus made to send out a carrier pulse with each step of the ground selector, the airborne and ground selectors will step in synchronism with one another.

When the ground selector rotor arrives at the contact point corresponding to the left rudder position, it completes two circuits through the remaining two poles of relay K_1. One of these is a holding circuit which short circuits the oscillator relay K_0 to keep the selector magnet and the transmitter keying relay K_X energized during the time that the brush contact is moving toward the insulated segment on the monitor rod, thus providing the long control pulse which causes the servo in the airborne unit to move the rudder to the selected position. The other circuit completed through the selector and relay K_1 is the servo monitor motor control circuit, which energizes relay K_L to supply current of the proper polarity to the monitor motor to cause it to drive the brush contact toward the insulated segment on the monitor rod.

The oscillator will of course continue to pulse, and relay K_0 will continue to open and close during the long control pulse; but this will obviously not affect the operation of the remaining units in the circuit.

When the brush contact reaches the insulated portion of the monitor rod, the circuit to relay K_1 is broken and the relay is opened, immediately breaking the oscillator, holding, and motor circuits, thus stopping all operation of the console units and terminating the carrier control pulse.

(To be concluded in the next issue.)

RADIO CONTROL INFORMATION

Because of many requests we receive for information covering all phases of model airplane radio control, we have compiled a list of all articles on the subject that have appeared in MODEL AIRPLANE NEWS. The first of these articles was printed in 1937, but almost all of the issues listed, including several in 1946, are now out of print. However, most cities have second hand magazine dealers who carry these old issues, and many libraries also have files of them.

Radio Control enthusiasts may obtain a free copy of this list by writing to: Model Airplane News, 551 5th Ave., N.Y. 17, N.Y.

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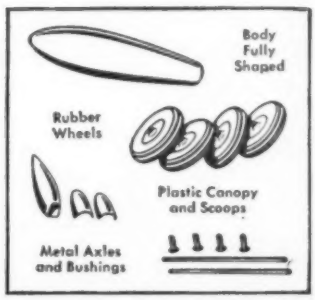

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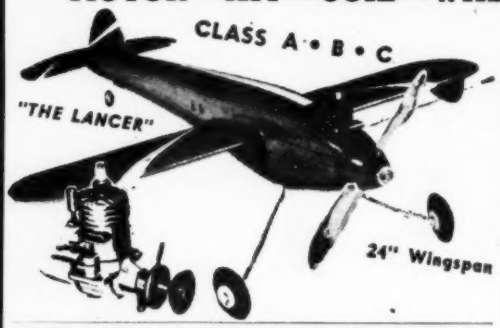

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Air Ways

(Continued from page 24)

control is always very small compared to those in the other standard events, and the latter are apt to get first call on timers, judges, field police and so on.

Lastly, it has been the rule to include radio control only at the largest meets, of which there are very few held throughout the country each year. It has been suggested, therefore, that it might be a good idea to have meets run *strictly* for radio control fliers. These meets would of course be small; how small we have no way of telling until we get a crossection of opinion from interested parties. Therefore we ask those fliers who would like to attend a meet for radio control only to send us their ideas on the subject.

Picture No. 1 shows an 8' *Buhl Pup* built from M.A.N. plans and photographed by A. Jamrisko, 6320 Marcus St., Detroit 11, Mich. This model, powered by a *Rocket*, went O.O.S. on its third flight and was never returned.

LeRoy S. Hubbard, 335 N. Main St., Lexington, Va. sent in No. 2 of his B25 which was built with the aid of a design analysis found in an old aviation magazine; construction took four months. Details of the model include: a cat walk, belts of bullets (phonograph needles), fire extinguishers, bombs, and a detailed pilot's compartment. All guns are movable, and the turret revolves. The elevator is movable from the cockpit, and the fuselage and wing centersection is planked. Started while the builder was in the Army, this model was carried on a crowded train from Texas to Virginia with only slight damage.

No. 3 shows a model of the Lockheed *Hudson* ready for covering. It was submitted by V. R. Dubery, "Oakwood Lea," Ellen Close Gardens, North Lane, Leeds 8, Yorks, England, who has been modeling for 14 years. Most of the building was done in the Navy while Mr. Dubery was in the crew room waiting for flying duty. The model incorporates an ingenous enclosed rubber motor system. Each motor passes diagonally from prop shaft to a common point right at the rear of the centersection at former No. 7. To effect this, the motor nacelle former is cut very thin on the inboard side, and the centersection main spar is made of piano wire bound to the spar of the outer panels and one of the fuselage formers. This system provides a useful motor run and preserves a realistic appearance. With a small model such as this (30" span) there seems to be no difficulty in the sideways pull of the rubber. Mr. Dubery reports that this model had a very good flight performance when flown in a hangar, taking off realistically and circling steadily two or three times. It was finally wrecked in travelling. Mr. Dubery claims to be the only person to have flown a model plane in the middle of the Atlantic! In his off-duty periods which sometimes coincided with an empty hangar, he amused the boys with an indoor model. Of course, the drafts and air conditioning added to the fun, and it proved quite a relief from hunting submarines.

Bob Magee, 1835 Noble Rd., E. Cleveland 12, Ohio submitted No. 4 of his *Grasshopper* built from plans in May 1943 M.A.N. He writes that he had quite a bit of rubber packed in the plane as he had put several coats of dope on the covering.

Jess S. Larsen Jr., 1251 Niles Ave., St. Paul, Minn. sent in No. 5 of his model of the Ryan FR-1 *Fireball* which will be

flown U-control with a third line throttle control. It has a 45" wingspan and is scaled 1-1/16" = 1' from the real ship. It is powered by an *Ohlsson 60* and weighs slightly over 4 lbs. The model is constructed entirely of wood. The fuselage was cut out of a solid block of balsa, and wings and tail are planked. All control surfaces are solid balsa. The canopy slides, but it is not scaled to the real ship. Look for this model at the Nationals!

No. 6 was sent in by P. Kelterborn, Gstaltenrainweg 17, Riehen bei Basel, Switzerland. His flying wing is an original design with which he won their National Contest last summer. The plane has a span of 170 cm and a glide ratio of 12 to 1. It is of half balsa construction and has made a lot of fine flights without any crashes.

Ronald Flint, 224 Puritan Ave., Highland Park 3, Mich. submitted No. 7 of his *Falcon* built from J. S. Luck's plans in M.A.N. The photo shows the plane as it was originally. It cracked up on its first flight and wrecked the wing mounts and body. Mr. Flint then rebuilt it, making the wing in one piece instead of the original three, and the body was partially planked. Since then he has had a number of good flights, including one where the timer stuck and he nearly lost it. The ship is powered by an *Ohlsson 23*.

No. 8 was photographed and sent in by Floyd Lahue, Highgate Center, Vt. and was designed, built and flown by Don Boardman of Swanton, Vt. who incorporated features of two or three different biplanes of the early thirties. The wings and horizontal tail were yellow, and the remainder of the plane was olive drab with conventional army insignia and markings of that time. This model had a 37" wingspan and was powered by an *Ohlsson 19*. It also employed an ignition switch that could be cut by a third line in flight, removable cowl and a hinged hatch to service the motor. It flew about 45 mph using 50' lines. The photograph was taken with a Kodak Jr. 116 camera, using a portrait lens. Floyd had the motor just turning over to get the effect of a spinning prop, and placed small stones in front of the wheels to prevent the plane from moving. For added realism, a carved pilot's head can be seen in the cockpit.

Edward E. Dingerson, 3320 West A St., Belleville 20, Ill. submitted No. 9 of his rubber powered *Korda* design. It is colored red and white and is made entirely of balsa except for the landing gear which is bamboo. The covering is Silkspan and the model has a span of 43".

No. 10 was photographed by Art Snyder, Hermosa Beach, Calif. and built and flown by Art Cummins, Highland Park, Calif. This Class C U-control speed job is powered with an *Atwood Super Champion* and its best unofficial time was 116.07 mph. For those interested in photography, this shot was taken with a Rolleiflex Standard at F 11 and 1/50th second.

J. E. Cleland, Two Matthews Hall, Harvard College, Cambridge, Mass. contributed No. 11 which shows his Scientific *Flea* powered by an *OK CO*$_2$. He found that with this model the engine is just powerful enough to pull it up in a shallow climb. If there is any wind, the model cannot be flown successfully. The lack of power, however, is well outweighed by the model's very shallow glide and its general realistic appearance in flight. The prop on the engine is an 8" Atom prop hacked down to 6".

(*Turn to page 73*)

GMCO NOTES

VOLUME 2 NO. 9 — AUG. 1947

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1/8 x 1/4 ..... 3c
1/8 x 3/8 ..... 5c
1/8 x 1/2 ..... 2 1/2c
1/8 x 3/4 ..... 3 1/2c
1/8 x 1 ..... 4c
5/16x3/16 ..... 3c
5/16 x 1/4 ..... 3c
5/16 x 3/8 ..... 3 1/2c
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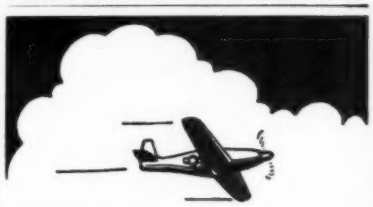

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½"...03 .02
¾....04 .03
1....05 .04 .10
1¼...08 .05 .15
1⅝...1c .07 .20
3.....15 .30
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No. 12 was submitted by William Hempstead, 562 Highland Ave., Clifton, N.J. It shows a towline glider equipped for radio control called "Cap de la Heve" which was built by Raymond Spiess, 82 rue Casimir Delavigne, Le Havre, France. This model has an 11' wingspan and weighs 8.8 lbs. The builder has a very large flat field to fly on, and he uses towlines of 200' to 300'. Mr. Hempstead has requested that the subscription due him for our use of the picture be sent instead to his French modelling friend.

NEWS OF MODELERS

A/C2 Robert Harbron, 36 Eamont Road, Norton, Stockton-On-Tees, Durham, England wishes to contact modelers in the U.S. and Canada who are interested in writing to members of the RAF model club (20 strong) to which he belongs. They have a large number of European aviation books which they would like to exchange, and they promise that each letter received will be answered.

R. C. Poad, 139 Victoria Rd., Darlington, Durham, England would like to exchange plans, magazines, photos, etc., with an American modeler; his club would also like to make exchanges with an American club.

Carlo Turbin, Corso Torino 56-14, Genova, Italy desires to correspond with a modeler from New York, and he promises to answer all letters.

Julio C. Celma, Chief of the Education Division, Condor Aeromodelling High School, 25 De Mayo St. 483—Campana, F.C.C.A., Argentine, would like to exchange information with American clubs and model builders.

CLUB NEWS

California

San Francisco Recreation Department announced the results of their 3rd Annual Spring Glider Tournament in their bulletin, *The Third Dimension:*

Junior Division

Towline Glider—1. Doug Smith 2. Jack Ritner 3. Bob King.
H. L. Glider—1. Doug Smith 2. Eddie May 3. Frank Pagano.

Senior Division

Towline Glider—1. Andy Tagliafico 2. Charles Dorsett 3. Angelo Lo Castro.
H. L. Glider—1. Roy Anderson 2. Angelo Lo Castro 3. Frank Devlin.

• •

From Tom Engelman, Chairman, comes further news of the All Western Open Model Aircraft Meet held June 27, 28 and 29. Motor displacements set for free flight and control line gas events were as follows:

Free Flight

Class A.....00 to .25 cu. in.
Class B.....26 to .45 cu. in.
Class C.....46 to .65 cu. in.

Control Line

Class A.....00 to .30 cu. in.
Class B.....31 to .50 cu. in.
Class C.....51 to .65 cu. in.

• •

Marin County's First U-Control Contest sponsored by the local Jr. Chamber of Commerce and the *Marin Power Modelers* was held at San Rafael on April 27. *Northern California Model News* reports the results as follows:

Class A Jr. Precision—1. Eugene Sale 2. Lester Duffy.
Class B Jr. Precision—1. Kingsley Chan 2. Royce Van Bebber 3. Louie Louie.
Class C Jr. Precision—1. John Pedracci 2. Eugene Stiles 3. Don Butman.
Class A Sr. Precision—1. Ray Regalia 2. C. L. Bussard 3. W. S. Biscay.
Class B Sr. Precision—1. Ray Regalia 2. Ken Skilling 3. Roy Mayes.
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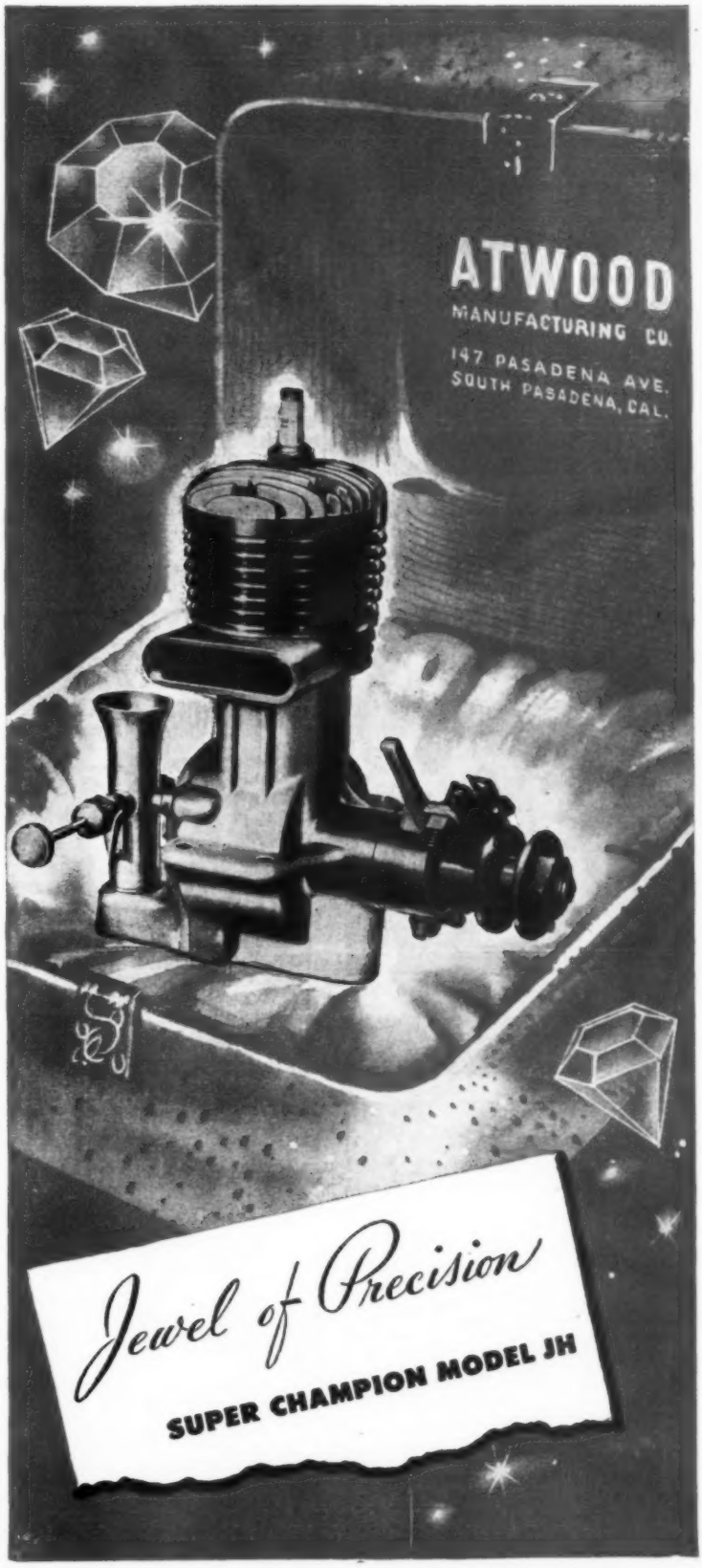

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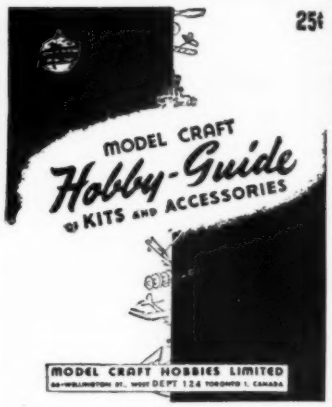

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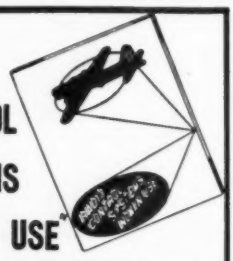

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Class A Sr. Speed—1. Mal Anderson 2. A. Pittenger.
Class B Sr. Speed—1. E. Ruth 2. B. Passarino 3. K. Sullivan.
Class C Sr. Speed—1. C. W. Mathews 2. J. Libonati 3. E. Huth.
Team—1. Don Butman, Tom Frazer 2. Howard McDonough, Ed King 3. John Harvey, John Pedracci. M. C. Kyle, Jack Douglas.
Novelty—1. Billy Peden 2. Don Mitolo.
Youngest Contestant—Billy Peden.

The *News* also contained the following results for the Record Trials and H.L.G. Challenge Contest held at Livermore Field March 9 by the *Oakland Cloud Dusters.*

H.L. Gliders Class B—1. Mike Demos 2. Pete Demos 3. Bob Blau.
H.L. Gliders Class C—1. S. Milisich 2. Carl Rambo.
T.L. Gliders Class E—1. M. Andrade 2. C. Potto 3. A. Wells.
H.L. Rubber Fuselage Jobs Class D—1. M. Andrade 2. S. Milisich 3. L. Parsons.
H.L. Glider Class A—1. Don Robbers.

Results of the first leg of second 1947 Challenge Round of Hand Launched Gliders on March 23 in Field Gymnasium, Sunnyvale were:

H.L. Gliders Class B—1. Mike Demos 2. Bob Blau 3. Pete Demos.
H.L. Gliders Class A—1. Chas. Pottol 2. Larry Parsons 3. Pop Robbers.
Indoor Flying Scale—1. Charles Pottol, Feisler-Storch.
Class B Stick—1. Bob Blau.
Class B Hydro-Fuselage H. L.—1. Carl Rambo.

Also from the *News* comes results of the U-Control Contest held by *Sacramento Skyoneers* March 16 at the Sacramento Junior High School:

Class C Speed—1. John Fulton 2. L. Perisich.
Class B Speed—1. K. Sullivan 2. Mack Jurisich.
Class A Speed—1. Archie Pittenger 2. J. Jandreth.
Precision—1. Dr. Sullivan.

* *

From June and Jack Dyer's *Aeroneer* comes news of the *Thermal Thumbers.* Officers are: Pres. Ralph McLaughlin; Sec'y. Chuck Cutter; Treas. Mr. Jones. This Southern California club is fortunate to have a president who is a professional photographer.

* *

The *San Diego Aeroneers'* Annual Gas Model Free Flight Contest was held at their field on Kearny Mesa on April 27 with the following results:

Class A—1. B. Hanford 2. K. Newbeiser 3. R. Randolph.
Class B—1. D. Davis 2. D. Hinkle 3. J. Thompson.
Class C—1. M. Ronney 2. L. Caton 3. H. Glines.
Junior—1. J. Haywood 2. C. Ransom 3. W. Trumbull.

Fresno Gas Model Airplane Club lists in *The F.G.M.A.C. News* these results of their Free Flight Meet on April 27:

Class A—1. Ronald Mosier 2. Gary Howard 3. Paul Nieto.
Class B—1. Bob Bissonette 2. M. Martin 3. Paul Rozell.
Class C—1. J. R. James 2. Fred Morgan 3. Bob Behunin.
Juniors—1. Fred Morgan 2. Ronald Mosier 3. Gary Howard.
Rubber Powered Event in conjunction with Gas Events—1. Rudy Lopez 2. Suiku Mataga 3. Shuji Maruko.

F.G.M.A.C. News also announced results of Stockton's 1st Annual Free Flight Contest held May 4 at Jerusalem Field:

Class A—1. Floyd Reck 2. Roy Anderson 3. Jim Elliot.
Class B—1. R. Allington 2. Jack Volponi 3. R. S. Bray.
Class C—1. Bill Steece 2. Mario Bertolucci 3. Ed Wooley.
Juniors—1. Avid Allen 2. Dave Lewis 3. Allan Rowan.

* *

Northern Eliminations for the East-West Challenge were held May 18 at Crissy Field in the Presidio, and the following contestants won their places:

Speed

Class I—1. Jack Dyer 2. Roy Mayes.
Class II—1. Mal Anderson 2. Ed Kroll.
Class III—1. Mal Anderson 2. Bill Richards.

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3 Props
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CLASS C

Ohlsson 60	$18.50
Vivell 35	18.00
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Class V—Leland Malloy 2. James Whitlach.
Class VI—1. C. W. Mathews 2. Joe Libonati.

Precision

1. Lester Duffy 2. Bill Thundberg.

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* *

From W. S. Biscay, *Albany Control Flyers*, comes news of their recent participation in a contest at Sacramento, at which Jack Douglas won a scholarship. Jim Smith's World War I Scale Model Spad won the flying scale model event for the fourth time. In the Junior Class "B" Precision event Walt Peterson won the second place trophy, and Fred Ernst won the third place trophy. In the Junior Class "C," John Pedracci won fourth place. Lewis Howard, a new member of *Albany Control Flyers*, entered the win column with a third place trophy in Senior Class "A" Precision, and Ken Skilling won the second place trophy in Senior Class "B" Precision Event.

Also from W. S. Biscay comes news of the participation of the *Albany Control Flyers* in a contest held at Crissy Field, San Francisco on May 18 at which members of the *Albany Control Flyers* won the Aero Modelers Assoc. Perpetual Trophy. Roy Mayes won second place in Senior Class "B" Precision, Ken Skilling placed third, and Win Biscay fourth. Roy Mayes won the first place trophy in Class C Precision, and Ed Dunkum placed fourth. In the Class C Junior event John Pedracci won second place. Bill Thunberg won the first place trophy in Junior Class "B" Precision, and James Freshman won second place in Junior Class "A" Precision. In Senior Class "A" Precision, Win Biscay won second place.

Connecticut

A Class AAA Connecticut State Control-Line Championship Contest was held by *Bridgeport Aeronuts* June 15 at Beardsley Park, Bridgeport. The meet was sanctioned by AMA and approved by the Connecticut Chapter of AMA. The sponsor was the Bridgeport *Herald*. Earl Gay Jr., 629 Boston Ave., Bridgeport was Contest Director.

* *

The *Prop Busters' Club* First Annual Invitation Meet was held June 22 at Trumbull Airport, Groton, Conn.

Florida

The South Florida Model Dealers Assoc. held a successful Free Flight Model Airplane Meet April 20 in Miami, with joint sponsorship of the U.S. Naval Air Reserve, Miami. Events included handlaunch glider, towline glider, rubber powered and free flight gas models. The SFMDA is a new organization formed this year and has plans for many outstanding events to be held in Miami.

Georgia

The *Atlanta Aero Engineers* held their AMA Sanctioned AAA Gas Powered and Rubber Model Airplane Contest on June 14 and 15 at Marietta Army Air Base.

Illinois

Aurora Aeronuts Model Club held a meet for club members only on June 8 and will hold a Class AA Invitation Meet on July 20. The club has received its AMA charter and all meets will be held Under AMA sanction.

Indiana

Elwood Prop Busters will hold their Third Annual Free Flight Meet on August 10, by AMA rules. The American Legion Louis Monroe Post No. 53 is sponsoring a U-Control tract for the club at the local airport on ground donated by the D and G Flying Service. Part of the work is being done by club members. The following officers were recently elected: Pres. Gene Collins; Vice Pres. Robert Bennett; and Sec'y.-Treas. Marvin Wells.

* *

From Raymond Ingram, 12644 Central Ave., Gary comes news of the formation of *Gary Gremlins Model Airplane Club*. Interested modelers should contact Raymond at the above address.

Kentucky

A U-Control Model Airplane Meet will be held July 25-26 in Louisville by the *Louisville ABC Model Club* with the sponsorship of the *Courier-Journal, Louisville Times* and Radio Station WHAS. The competition is to be held at Parkway Field. Night events will be possible under the lights used there for night baseball. Official AMA sanction has been obtained. Four speed events are scheduled: Class 1 for ships from .0 to .200 displacement; Class 2, .201 to .300; Class 3, .301 to .500; Class 4, .501 to .650. Rules and entry blanks may be obtained from J. A. Strobl, Secy. *Louisville ABC Model Club*, c/o *Courier-Journal, Louisville Times* or Radio Station WHAS, Louisville 2, Ky.

Massachusetts

G. Kaiser, Secy. of *Boston Balsa Bees*, reported that wet and windy weather has reduced their flying to the bare minimum.

May 11 being the first successful day of flying in a month. This club is making an effort to secure sponsors for flying meets. Interested clubs in the area may contact G. Kaiser, 61A Franklin St., Allston 34, Mass.

Minnesota

Junior Chamber of Commerce of Fairmont is planning a Model Airplane Contest to be held July 20. Three previous contests held previously, before the war, were quite successful. Edward J. Powers is Contest Director.

Missouri

The St. Louis Air Fair on May 9 had a special exhibition of the latest types of model aircraft sponsored by the *Greater St. Louis Modeler's Assoc.*

* *

Skykings Model Airplane Club will hold its Third Annual Contest at Kansas City on July 13 under sponsorship of the local Junior Chamber of Commerce. This contest has been sanctioned by AMA and by *Mid-States Model Aeronautical Assoc.* as an AA Invitational Meet. Jr., Sr. and Open events will be held in Class A, B, and C Free Flight, Open Rubber, Handlaunched and Towline Gliders, and Jet Powered Ships.

New Jersey

News comes from Secy. John Dyr of the formation of *Passaic Rubber Heels;* other officers are: Pres. Al Casano; Vice Pres. Peter Kovalski; Treas. Donald Fisher. Their primary aim is to further rubber powered models and to standardize their ships, developing and improving until they have a few designs down pat. Although they specialize in all types of rubber models, handlaunched and towline gliders, they welcome all modelers with good character and a sense of sportsmanship and fair play. Meetings are held every Thursday evening, 7 p.m. at their clubrooms, 162 Main Ave., Passaic; weekly club contests are held Sundays at the old Delawanna Airport under strict AMA rules and are based on the point system.

* *

Linden Model Aircraft Club held their AMA sanctioned Annual State Rubber Power Championship Meet on July 6. Events included Fuselage, Stick, Towline, and Handlaunched Gliders, all classes. Officers elected April 4 are: Pres. Silvio Colletti; Vice Pres. Leon Shulman; and Secy. Anne Schmidt.

New York

The 1947 Mirror Flying Fair was held on May 25 at Bethpage, L.I., and in spite of a total lack of cooperation from the weather authorities, was still quite a success. Profiting from experience gained in a meet held last fall, the committee that ran this event really had everything under control (except the weather, that is) and there were plenty of timers and judges, excellent field policing, and an entrance list limit of 700 contestants. As it turned out, the weather was so poor that only 550 fliers turned up; but even so several U-Control records were broken. Free flight models, even with 10 sec. motor runs, were going out of sight in the mist overhead, and the wind was strong and gusty. The radio control boys had just about gotten their equipment set up when the rain started and kept them completely grounded.

Top winners in all events were:

Free Flight Class A—1. William L. Effinger. 2. Frank Schmidt, Jr. 3. Ralph N. Jackson.

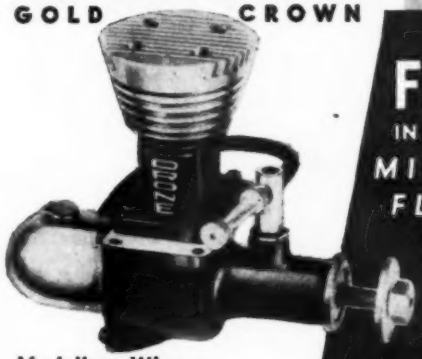
Free Flight Class B—1. Ernest Terry. 2. Frederick M. Forstchen. 3. Richard T. Blazej.

Free Flight Class C—1. Edward Ritter. 2. Robert Darakjian. 3. Eli L. Weaver, Jr.

U-Control Class A—1. Jack Norris. 2. Harold F. DeBolt. 3. Jack Sellers.

DRONE diesel

GOLD CROWN



WINS FIRST PRIZE IN STUNT COMPETITION MIRROR MODEL FLYING FAIR New York, May 25th

ALSO 1st, 2nd and 4th In Stunt Competition Atlantic City, May 4th

AND FIRST PLACE N. J. STATE CHAMPIONSHIP STUNT FLYING May 30, 1947

Modellers Wise . . . dieselize with DRONE diesel

Not only is the DRONE lighter because it requires no ignition system but it is more powerful! Its reliability enables the modern DRONE DIESEL flyer to fly when others are grounded with ignition troubles. *REMEMBER! You won't moan when you own a DRONE!*

FREE FLIGHT ATTACHMENT — PATENTED engine attachment is available as a unit ready to install.

SPECIFICATIONS:

Class B. Displ. .297 Bore 21/32
Stroke 7/8" Weight 9½ ozs. Prop. 6"-10"
Compression Ratio 18/1
RPM averages 2000-12000

COMPLETE READY TO RUN $21.50

WATCH FOR NEW DRONETTE . . .
The First Model Plane Designed for Diesel Power Flying.

DRONE ENGINEERING CO., 125 Broad St., Elizabeth, N. J.

AN AIR AGE PUBLICATION "FLYING SCALE MODELS"

Detailed plans, photos and instructions for building 16 flying scale military planes designed by Stahl, Weiss and Struhl.

$1.50 at your model or book shop, or direct from Air Age, Inc. 551 5th Ave., New York 17

The Mounting You Have Been Waiting For!

The "TEARDROP"

At last RoHaJa presents a mounting for your models worthy of your painstaking efforts. The first truly streamlined, fully contoured, plastic pedestal on the market. Designed to please the most discriminating scale model builder. Offered in a variety of colors to assure complete harmony with the color scheme of your favorite model. (Design Patent Pending)

AT YOUR DEALERS
(Jobber's inquiries invited)

Approx. 3¾ x 4½ Only 49c ea.

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P.O. Box 268 Cuyahoga Falls, Ohio

BIG Assortment GUNS & BOMBS 25c

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Special big assortment of 14 die-cast finely detailed BOMBS and GUNS.

BLOCKBUSTER 8c
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PROPELLERS STANDARD TYPE Die Cast White Metal

ALUMINUM Adjustable Pitch		2 Bladed		3 Bladed	
7½"	.25	No. 13	.05	1½"	.08
8"	.25	No. 14	.07	2"	.10
9"	.30	No. 15	.08	2½"	.15
10"	.35	No. 16	.10	3"	.20
		4"	No. 17	.12	4½"	.25
		4½"	No. 18	.15	5"	.30

ALUMINUM Tubing .010 Wall	per foot	Spinner Type		4"	No. 7	.35
		3¼"	No. 1	.18	4½"	No. 8	.50
		4"	No. 2	.20	5"	No. 9	.55
1/16"	.12	4½"	No. 3	.22	5½"	No. 10	.65
3/32"	.12	5"	No. 4	.25	6"	No. 11	.75
1/8"	.12	5½"	No. 5	.30	ADD 3c EACH FOR MAILING		
		6"	No. 6	.35			

Boat and airplane fittings—parts also largest complete line of O-MO-GO gauge Railroad parts available anywhere.

Send for your catalog and assortment today! Catalog only 5c to cover mailing.

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Announcing SWEEPING PERMANENT PRICE REDUCTIONS ON OHLSSON & RICE ENGINES

EVER since the beginning it has been the ambition of Ohlsson & Rice to produce a quality engine for each class of model flying *at prices every model builder could afford.*

Up to the present, Ohlsson & Rice prices have remained substantially unchanged through the years. To reduce quality in the slightest degree would have been detrimental to the best interests of the model sport. Our price structure was therefore maintained to permit highest quality, while developing the special automatic machines that would still further improve quality and rate of production.

During this period of more than ten years, Ohlsson & Rice has grown to be the largest factor in the model engine industry. Year after year, we have added special high speed automatic equipment, much of it developed in our own shop, and much of it not duplicated in any other plant.

Now—at last—we are able to give back to gas modelers—at important savings—the finest miniature gasoline engines ever produce.

The new low prices shown on this page are not a price "cut", or a clearing out of unwanted merchandise. They are the new permanent price structure for the Ohlsson & Rice 19, 23, and 60 Special—the "standard of the model world" engines that have sold for years at much higher prices.

Your dealer has all three engines at the new low prices now. Here is the opportunity for all those modelers who have been waiting for lower prices to get the reliable power plants they have long wanted—*at prices every model builder can afford.*

If your dealer cannot supply you, orders may be sent direct to the factory.

O&R 19 *formerly* **$14.50** **$9.95**

O&R 23 *formerly* **$16.50** **$9.95**

O&R 60 SPECIAL *formerly* **$18.50** **$11.95**

OHLSSON & RICE, Inc.

Standard of the Model World

EMERY AT GRANDE VISTA • LOS ANGELES 23, CALIFORNIA

U-Control Class B—1. Harold F. DeBolt. 2. "Speed" Ambler. 3. Stanley Sieminski.
U-Control Class C—1. Ernest Babcock, Jr. 2. Alan B. Ryder. 3. Lou J. Andrews.
Stunt Exhibition—1. Francis E. McElwee. 2. Paul G. Heisler. 3. Lou J. Andrews.
Beauty Exhibition Scale Model—1. Albert C. Mueller. 2. Raymond O'Neil. 3. Arthur Hasselbach.
Beauty Exhibition Non-Scale Model—1. Robert J. Hartlieb, Jr. 2. "Speed" Ambler. 3. John Abrasinski.
Jet Exhibition—1. Richard W. Mahoney. 2. Daniel J. Mass.
Special Free Flight Class for Grumman Employees—1. Francis Savarese. 2. Walter Herr.

* *

Prop Spinners Club of Elmhurst have changed the date for their 8th Annual Championship Meet from August 3 to July 20 at Creedmore. AMA sanction has been reapplied for. Events will include A, B and C Free Flight Gas and combined classes of Towline Glider.

* *

Long Island Model Flyers of 9 St. John's Road, Oceanside, held a recent contest which included all classes of free flight and U-Control. Winners were:

1. Ernest Pfeffer 2. Dick Kosby 3. Ralph Seidenspinner.

* *

Mike Jordan, Club Secy., sent in results of a recent contest held by *Flying Bisons* at Wherly Drive, Williamsville:

Control Line, Class A—1. De Bolt 2. Jordan.
Control Line, Class B—1. De Bolt 2. McCarthy 3. Kirk.
Control Line, small C (.30-.50)—1. De Bolt 2. Milliard 3. Kreihbal.
Control Line, Class C—1. Campiony 2. Wagner 3. Millet.
Stunt—1. Millet 2. Kreihbal 3. De Bolt.

North Carolina

Prop Twisters Model Club held their contest, The Southeastern Model Championships, on July 6 with the sponsorship of The Exchange Club of Greater Greensboro and Coble Sporting Goods Co. There were six classes of speed according to AMA rules plus Precision and Appearance events. Scott Eubanks, Publicity Manager, advises that this contest was also an eliminations meet for the coming East-West contest.

Ohio

The Air Force Association Meet was held at Central Armory, Cleveland on April 26 with the following results:

Gliders

Junior Division—1. Ray Vargo. 2. Michael Onofrey. 3. Robert Gabriel.
Senior Division—1. Richard Fox. 2. Jack Keleher. 3. Al Chute.
Open Division—1. R. W. Obarski. 2. George Reich. 3. Joseph Elgin.

Stick Models

Junior Division—1. Edward Gomersall. 2. Dennis Baughman. 3. John Humphries.
Senior Division—1. Herbert Baugham. 2. Richard Schubert. 3. Wesley Ulmer.
Open Division—1. R. W. Obarski. 2. George Vasenko. 3. Joseph Elgin.

Fuselage Models

Junior Division—1. Edward Gomersal. 2. Donald Weisenswee. 3. Jerry Gross.
Senior Division—1. Paul White. 2. Robert Madsen. 3. Dick Schubert.
Open Division—1. R. W. Obarski. 2. Chester Lanzo. 3. Richard Korda.

Members of the Cleveland Women's chapter of the N.A.A. who have assisted in the organization and running off of the *American Airlines Gas Model Club* for several years, attended the club's annual banquet in March. For the fourth consecutive year, Jack Norris of Lakewood, Ohio was voted club champion and received the Frank Kellogg Memorial trophy and the Speed Champion trophy. The trophy is a new award this year, established in memory of Frank Kellogg, former club member who was killed in service. The Speed Champion trophy is a permanent award for collecting the most points in control line contests during the year.

South Carolina

Greenville Torque Flyers recently reorganized after disbanding during the war. Officers are: Pres. Bill Carter; Vice Pres. Tom Bass; Secy.-Treas. Arthur Delaney. The club has had one contest since reorganization with results as follows:

Control Line

Class C—Tom Bass
Class B—Johnny Heidinger

Free Flight

Class C—Bill McKinney
Class B—Bill Carter
Class A—Marion Anderson

The club flies on Sundays at the Municipal Airport and meets at the American Legion Hut every other Wednesday night at 7:30. The Club Secy. lives at 204 N. Laurens St., Greenville.

Texas

Helmer Johnson Jr., Corresponding Secy. of the *Cowtown Sahibs* of Fort Worth, writes of the formation last November of this new club which now has 30 flyers. Meetings are held every other Wednesday at the YMCA. This club is fortunate in having numerous parks in which to fly. The Fort Worth Police come out to watch them rather than chase them away. Roy Pate is the speed man, turning in consistent flights of 104 mph with his *McCoy 49* powered *Lil' Vamp*. Bobby Lutker and Jimmie Eastland always put on a good show by flying tight formation. For all-around thrills, a free-for-all dogfight is the main attraction put on by Gordon Bourland, Jimmie Eastland, Pogue Ramsey, Bobby Lutker and Chuck Cunningham, all flying in the same circle at the same time. At present, they are working on a stunt in which two planes in the same circle fly in opposite directions, one of them inverted. Inverted flying, outside loops, and 8's are a must before a *Sahib* can call himself a stunt man.

Virginia

Richmond Modellers Association sponsored an all free flight contest on June 22, and an all U-Control contest on June 29. Both meets were AAA, AMA sanctioned.

Washington

Kenneth S. Perry of Northwest Hobby Co., Spokane sent in news of a contest held July 4, 5 and 6 to determine the Washington State entrants in this year's Nationals. Winners of the contest were given free all-expense trips to Minneapolis. The contest was run by the *Spokane Model Airplane Club*, sponsored by the Optimist Club of Spokane.

Alaska

The *Alaska Model Association* held its second control line contest June 21 at Merrill Field in Anchorage. This was an AMA sanctioned meet in conjunction with the Annual Air Rendezvous. Speed (Jr., Sr. and Open), Beauty, Scale, Stunt and exhibition were the events. News was sent in by Alfred Person, Pres.

New Zealand

June 2d, the King's Birthday, was a big day for the *New Plymouth Club*. After the war years of improvised fields for rubber flying, and having to travel 50 miles for gas models, permission has at last been granted for use of the local airport for flying. All Taranaki Clubs were represented on June 2d except Hawera (50 miles away) where we used to go. Thanks are given to Gordon P. Smith, the untiring sec'y. and A. J. Robinson, for their work in keeping alive during the war the *N.P. Club*, the *only* Club in N.Z. that held regular meets right through the war, even though *every* adult was a volunteer.

The South's Finest Shop Devoted to MODELS!

Lightning Service

Postage Prepaid Anywhere in the U. S.

MOTORS

CLASS A

Elf Single .067	$21.50
Arden (PB) .099	16.50
Arden (BB) .099	19.50
Mite Diesel .099	18.95
Elf Twin .194	34.50
Arden (BB) .199	21.50
Ohlsson "19"	14.50

CLASS B

Ohlsson "23"	16.50
Bullet .275	15.00
Torpedo .30	18.50
***OK" 29	18.50
Forster 29	19.50
DeLong 30	19.50
Cannon .300 (new type timer)	19.75
Drone Diesel .300	21.50

CLASS C

Cannon .358 (new type timer)	21.50
Aire Mighty Midget .45	24.95
Madewell .49	18.00
McCoy .49	25.00
Pacemaker .59	24.95
Ohlsson "60"	18.50
Orwick .60	32.50
Atwood Champion	23.50
"OK" 60	18.50
Fleetwind .60	24.75
Contestor D-60	28.50
Super Cyclone	22.65
Super Cyclone (dual ignition)	23.40
McCoy (Red-head)	35.00
Hornet	35.00
***OK" Twin-I .20	55.00
OK's Cox Engine (*Includes Coil & Condenser)	7.50

TOOLS

Handee DeLuxe Grinders	$20.50
Handee Ultra-DeLuxe Grinders	27.50
Casco Grinder	22.50
Pistol-Grip Soldering Iron	9.95
King-Kut Knife Sets	$1.00 to $10.00

GAS MODELS — Free Flight

Airfoiler	$ 3.95
American Ace A—36"	1.50
American Ace B—54"	3.00
Cleveland Baby Playboy	1.00
Bayridge Diamond Demon	2.00
Bayridge Mike	2.00
Brigadier B—58"	2.95
Buckaneer A—48"	3.50
Buckaneer C Standard	5.95
Capitol Cub A	1.95
Capitol Super Cruiser	10.95
Capitol Honey B	3.95
Capitol Aeronca	4.95
Cleveland Playboy Jr.	3.25
Cleveland Playboy Sr.	6.00
Cleveland Stinson	17.50
Comet Interceptor	3.95
Comet Zipper	5.95
Comet Zipper A	1.95
Comet Sailplane	8.95
Eagle Bee	1.95
Eagle Jiffy	1.50
Eagle Spearhead Junior	3.95
Eagle Vagabond C	5.50
Eagle Wanderer B	3.50
Eagle Skybo	6.95
Javalin A-B	3.95
Pewer House	4.95
Scientific Larkey B	3.50
Scientific Mercury C	5.50
Scientific Humdinger	3.95
Sky Buggy	5.95
Spearhead Jr. A-B	1.95
Super Sundueter	8.95
Supreme Sportsman	5.45
Whirlaway	8.95

GAS MODELS— CONTROL LINE

Ameco Trainer	$ 3.95
Ameco Short Snorter	2.95
Ameco Scat	7.50
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Berkeley Mustang	7.95
Berkeley Bearcat	5.95
Berkeley Bat	4.95
Berkeley Bee	3.95
Berkeley Bug	2.95
Bill Warner's Strato-Cat	5.95
Bipe	3.95
Capitol Ercoupe	7.50
Capitol Skycycle	7.50
Capitol Beachcraft	9.95
Comet Whizzer DeLuxe	9.95
Comet Wildfire	1.95
Comet Rookie Trainer	2.95
Dmeco Special	7.95
Eagle Hellcat	4.95
Eagle Thunderbolt	4.95
Edco Autogyro	7.50
Edco Navion	5.95
Goldberg Zing	4.95
Hell Hammer	7.95
Modelcraft Whippet	3.95
Modelcraft Greyhound	3.95
Monogram Whirlwind	7.95
Monogram Jr.	2.95
Scientific Trailblazer	2.95
Sullivan PDQ	5.00
Sullivan PDQ Sr.	7.50
Sullivan PDQ Sport	7.50

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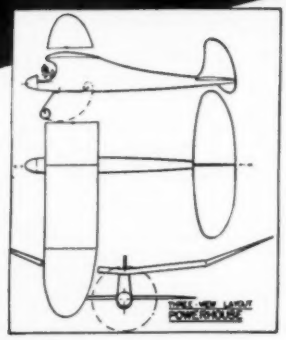
Hobbycraft Dept., MAN-8. 416 Church St., Nashville, Tenn.

Now available for all 3 classes of contest flying

the World's Record Breaking KORDA *POWERHOUSE*

By **BERKELEY**



Here is the greatest free-flight gas model of the 1947 season. Last year it broke the official Class "B" record twice in one day. This year the Powerhouse "56" has been winning meets all over the country. The Powerhouse "41" won the Mirror Meet on May 26, 1947 at Bethpage, Long Island.

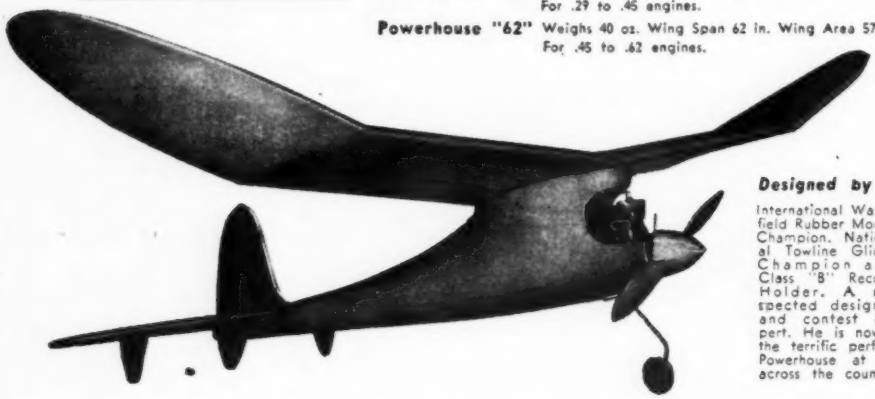
Hundreds of Model builders have asked Berkeley to produce Powerhouse kits for Class "A" and "C" competition. They are now ready in time for the big Summer and Fall Contests.

The Powerhouse introduces a new technique in free-flight flying. It uses a small high-pitch prop. It takes off at a terrific speed and climbs at its most efficient angle rather than hanging on its prop like old-fashioned contest designs. Winner of first or second place in every meet entered to date this year. Unofficially timed flights of over four hours have been reported.

Powerhouse "41" Weighs 20 oz. Wing Span 41 in. Wing Area 272 sq. in. For .19 to .23 engines. **$3.95**

Powerhouse "56" Weighs 32 oz. Wing Span 56 in. Wing Area 458 sq. in. For .29 to .45 engines. **$4.95**

Powerhouse "62" Weighs 40 oz. Wing Span 62 in. Wing Area 572 sq. in. For .45 to .62 engines. **$5.95**



Designed by Dick Korda

International Wakefield Rubber Model Champion. National Towline Glider Champion and Class "B" Record Holder. A respected designer and contest expert. He is now demonstrating the terrific performance of the Powerhouse at major contests across the country.

Examine these Features Found in the Korda "POWERHOUSE"

Rugged Fuselage

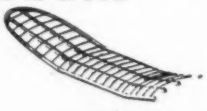
Built around a simple rugged crutch, with die cut plywood firewall, strong planked bottom, basswood engine mounts. Note the clean functional lines.

Retracting Landing Gear

All parts are ready made. So simple in operation that it's impossible for it to fail.

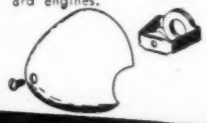
Wing Design

The super-efficient wing has a strong internal double spar, plywood enforced. Tips are laminated balsa. Ribs give a smooth air foil shape for the full chord.



Aluminum Spinner

Every kit includes a massive Berkeley Aluminum Spinner giving clean lines to the entire model. The spinner is ready-notched for the propeller and is complete with an adapter to fit all standard engines.



PLUS:

- Accurately Cut and Selected Balsa
- Printed-out Balsa Parts
- Genuine Silkspan Covering
- Super-detailed Plans with Phantom Construction Drawings
- Complete Hardware
- Streamline Wheel
- Berkeley Cement

Attention Dealers!

Place your orders for these kits with your distributor immediately to be sure you have a sufficient stock for the forthcoming contests!

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HAS THESE FAMOUS SCIENTIFIC MODEL KITS

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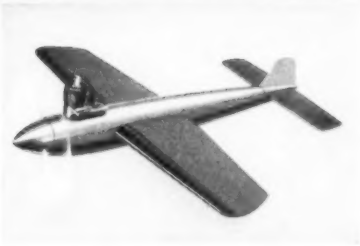
Scientific's "TRAIL BLAZER"

with U CONTROL



24" WINGSPAN 6" CHORD

Accommodates class A-B or C engines —qualifies for class II, III, IV, V and VI Control-line competition. New sturdier construction with plywood "Backbone" and formed aluminum fuselage top.

2.95

"GOOD NEWS"
FREE FLIGHT or U-CONTROL

Class "B"—Wingspan 30", length 36". Kit includes a pair of rubber wheels.

$3.95

"MERCURY"
WITH U-CONTROL

Class "C"—Wingspan 72", wing area 720 sq. in. Complete kit with a pair of 3½" rubber wheels and U-Control parts.

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"HUMDINGER"
A PROVEN CONTEST WINNER

Class "B"—Wingspan 32", wing area 426 sq. in. Kit includes a pair of 2½" rubber wheels.

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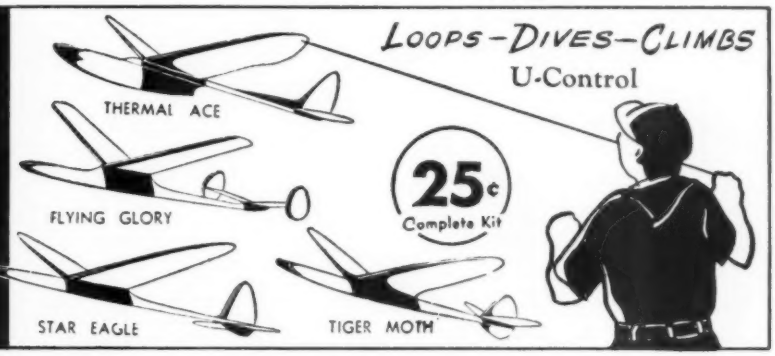
"MERCURY, Jr."
FREE FLIGHT or U-CONTROL

Class "B"—Wingspan 30", length 36". Kit includes a pair of 2½" rubber wheels.

$3.95

Now!
U-CONTROL
GLIDERS



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ATOMIC $3.50

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FUEL TANK ENGINE MOUNT UNIT

for U CONTROL and FREE FLIGHT

Combination radial and beam mounting.

$1.50 including flexible fuel line

SIDE PORT
RADIAL OR BEAM

ROTARY VALVE
RADIAL OR BEAM

INVERTED
RADIAL OR BEAM

for all O & R 19's or 23's *no matter when purchased*

Here's a new gas tank and engine mount combination designed to give O & R owners *more* flying efficiency and enjoyment. Look at this list of improved features:

1. Has 4½ times greater fuel capacity, permitting longer sustained U-control flights. 2. Gives you any type mounting: radial or beam, inverted or upright, for either free flight or U-control. 3. Mounting lugs are tapped to take regular crankcase screws so no nuts required to attach engine to tank. 4. Tank is extremely sturdy and rigid—yet weighs only ¾ oz. 5. Can be used with any O & R 19 or 23 so you can change from Class A to Class B in a matter of minutes *without removing tank from ship*. 6. Equipped with new spring-loaded filler cap for quick and easy filling.

All these features, plus Ohlsson & Rice engineering, add up to the *ultimate* in fuel tank and engine mounting efficiency. See them—and get yours today—at your dealer's. (If there is no dealer in your locality order direct from the factory.) Free—Folders on O & R engines and accessories.

All Rotary Valve units shipped since May 1 contain an Interchangeable Venturi, for easier handling. If yours does not, your dealer will supply one free.

THINK TWICE PERFORMANCE PRICE GET AN *Ohlsson & Rice* STANDARD OF THE MODEL WORLD

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